ELECTRICAL REVIEW

11th APRIL, 1952

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British Shipbuilding

GREAT Britain continues justly to claim possession of the largest merchant fleet in active employment, although the United States is entitled to pride of place in respect of the largest tonnage registered under one flag. Rather less than the normal amount of tonnage is being scrapped just now, for obvious reasons, so that a great deal of work is in prospect for those who build ships and equip them, including makers of marine electrical plant.

According to Lloyd's Register of Shipping plans were dealt with last year for 750 ships to be built to the Society's classification, representing the greatest total gross tonnage (exceeding 4 million) of any peacetime year. Work actually commenced, on 608 ships, was equally satisfactory; in addition 760 sets of marine engines approximating to 3·2 million s.h.p. were being built as well as electrical installations of about 125 MW capacity and 92 refrigerating installations (which also need electrical machinery) for use in ships.

Of the gross world tonnage of 87¼ million, electrically propelled vessels accounted for nearly 5·4 million tons. Steam turbo-electric ships of 5,151,225 tons gross in 1951 showed a fall of 62,449 tons on the previous year, but their tonnage had risen from the 468,583 pre-war total and from 171,150 tons in 1929. The diesel-electric tonnage of 197,527 did not make such a striking advance: it grew by 2,850 tons during the year, by 17,706 tons since 1939 and by 109,210 tons since 1929. An outstanding event of the past year was the full-scale trial of the first marine gas turbine, installed in the tanker *Auris*, which is propelled by a.c. plant of unusually interesting design. The main purpose of this experiment is to establish the sea-going reliability of a gas turbine when burning boiler fuel oil, in which connection it is relevant to remark that oil is the fuel used by 83·2 per cent of the world's tonnage. There is reference in Lloyd's annual report, which is summarized on another

page, to the fractures sustained by a small number of the very many welded ships built during the war. A general statement on the subject was also made by the Society recently. Remembering the speed at which these vessels had to be fabricated during the war—118 "Liberty" class ships were delivered in December, 1943, each of which had been built in less than 40 days from keel laying—it has not been difficult for *Welding and Metal Fabrication* in its April issue completely to vindicate welded ship construction in Great Britain.

SAFETY AT SEA

A sufficient number of countries have ratified the International Convention on Safety of Life at Sea, 1948, to enable it to come into force in November of this year, two years later than was originally intended. It was negotiated in London and will supersede the 1929 Convention, which did not contain any electrical clauses. The new Convention is thus noteworthy for its rectification of omissions; although limited to safety aspects and emergency sources of power, it will require important changes in electrical design and layout. Meanwhile a number of owners of passenger ships, recently built or under construction, have voluntarily anticipated in their ships many of the new Convention requirements.

BANNED PUBLICITY

Lord Citrine has our sympathy in the predicament he showed himself to be in when he spoke at a recent meeting in London. He said that nowadays the British Electricity Authority was limited to advertising its failures and telling people that they must not use electricity during peak times. As he said, this was not conducive to good public relations. It is true that any attempt of the B.E.A. and Electricity Boards to encourage the use of electricity even in off-peak hours is condemned by the "authorities." And yet the advocacy of the use of more and more good coal is being officially encouraged. We face electrical retrogression in this country while other, more enlightened, nations are going ahead.

"PRODUCTIVITY"

The news that the Anglo-American Council on Productivity is not sponsoring any more visits by "industrial teams" comes while an American team is visiting this country to see if anything can be learned from our electricity supply system. No doubt the visitors from Great Britain to the United States, from a wide variety of industries, have picked up a good deal of useful information. Much which they have seen could only be applied in American conditions—primarily a vast home market—but much more is equally applicable here. Little has been made known so far regarding the adoption of useful American methods in British industry as a result of this interchange. It is possible that the Anglo-American Council's swan song may take the form of a survey of what has actually been done as a result of the visits.

HYDRO-ECONOMICS

The distinction between kW and kWh is not always easily grasped by non-electrical people. This fact perhaps accounts for some of the criticisms of the North Wales Hydro-Electric Power Bill during its second reading as well as for recent adverse comments on water-power stations in Scotland, also designed for operation at low load factors. Their primary function is to provide kilowatts of plant capacity at least overall cost at times when most needed. The annual "units" output and hence the coal saved could possibly be increased in some cases, but only by incurring disproportionately heavy capital expenditure on the provision of storage capacity.

Paper Mill Installation

Economical Power and Heat Linkage with Power Station

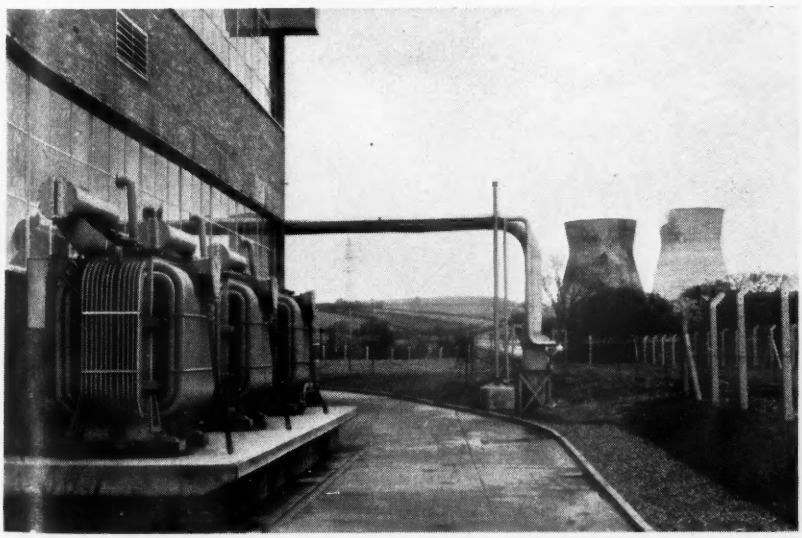
By selecting a site for their mill within half a mile of the British Electricity Authority's Llynfi generating station, Bridgend Paper Mills, Ltd., are able to obtain cheap supplies of steam as well as electricity from the power station, thus avoiding the capital and operating costs of a private steam generating plant.

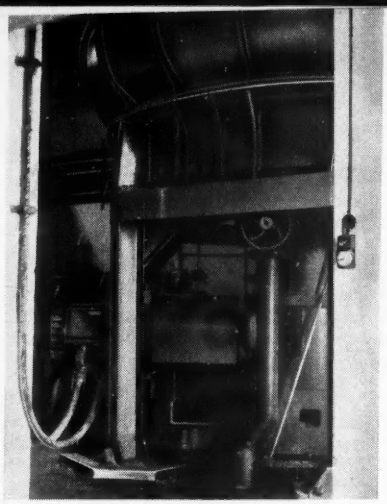
The steam, which is used both for process work and space heating, is normally bled from the turbines in the power station but if these are running on reduced load or are shut down for any reason, there is a connection from the high pressure bus main through an automatic reducing valve into the 10in main which supplies the paper mill. The pressure at the turbines is approximately 60 lb/sq in absolute; a Hopkinson's automatic pressure reducing valve is installed to keep the pressure at the entry to the mill constant at 25 lb/sq in gauge. Steam supply to the mill is metered by a Bailey recording flow meter, and returned condensate is metered at the power station.

At least 90 per cent of the condensate is collected and pumped back to the power station through a 3in pipe-line by means of one of two 6 h.p. Mather & Platt electrically driven pumps, controlled by Simmonds Aerocessories combined float depth gauges and switches. All pipework, collecting tanks, etc., were supplied by Stewarts & Lloyds, Ltd., while Versil, Ltd., was responsible for the heat insulation, comprising 3in radial thickness of glass silk on the main steam pipe ($\frac{3}{4}$in on the condensate pipe), over which are exterior coverings of tarred felt and pyluminized sheet aluminium, riveted in position to give a waterproof and durable finish.

Electricity is purchased from the South

The electricity supply is received from Llynfi power station through three 1,500 kVA 11,000/415/240 V transformers. In the photograph reproduced the steam pipe-line can also be seen





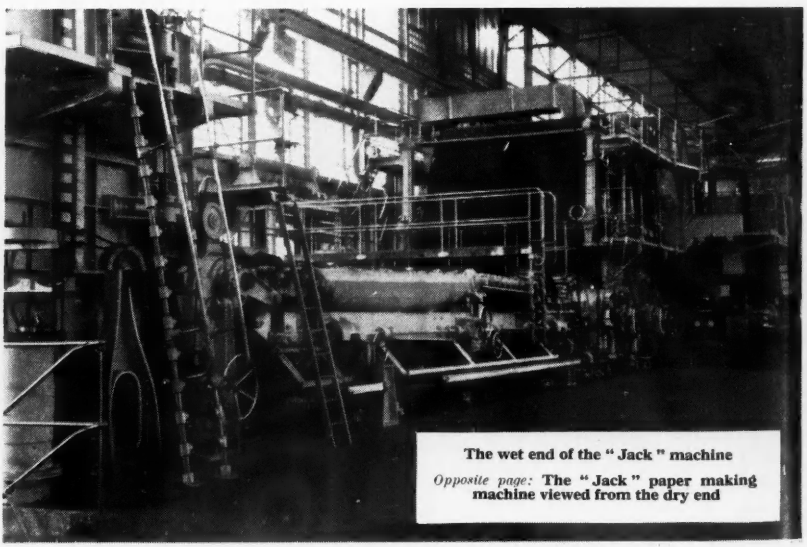
The drive of one of the " Hydrapulpers " in which the process of preparing the stock is begun

Wales Electricity Board and is supplied at 11 kV, 3-phase, 50 cycles from the power station auxiliary busbars through two 0·15 sq in p.i.l.c. s.w.a. cables laid direct in the ground and brought into the mill sub-station. Here it is controlled and metered on a 5-panel South Wales Switchgear air insulated switchboard with solenoid-operated oil circuit breakers having a rupturing capacity of 250 MVA.

From this board are supplied three 1,500 kVA oil-immersed outdoor type power transformers (also made by South Wales Switchgear, Ltd.) which have off-load tap changing switches and Buchholz protection as well as temperature alarms. The l.v. sides of these transformers feed a 14-panel switchboard through three 3,000 A solenoid-operated oil circuit breakers, at 415 V, with neutrals brought in and earthed to give a single-phase supply at 240 V.

To limit connected load and fault current, and to localize failures of the supply, the switchboard, supplied and erected by the Brush Electrical Engineering Co., Ltd., is sectionalized by means of bus section switches, Castell-key interlocked with the transformer switches. The outgoing feeders provide supplies to the stock preparation plant, the three paper machine drives and general and essential services in the paper mill. All the oil switches on the board are of 25 MVA rupturing capacity.

Closing, tripping and indication on both these switchboards are actuated by a d.c. supply from a 220 V battery, which can also be used to energize an emergency pilot lighting system in the paper mill, through automatic contactors, in the event of a complete failure of the a.c. power from Llynfi. The battery and its automatic



The wet end of the " Jack " machine

Opposite page: **The " Jack " paper making machine viewed from the dry end**

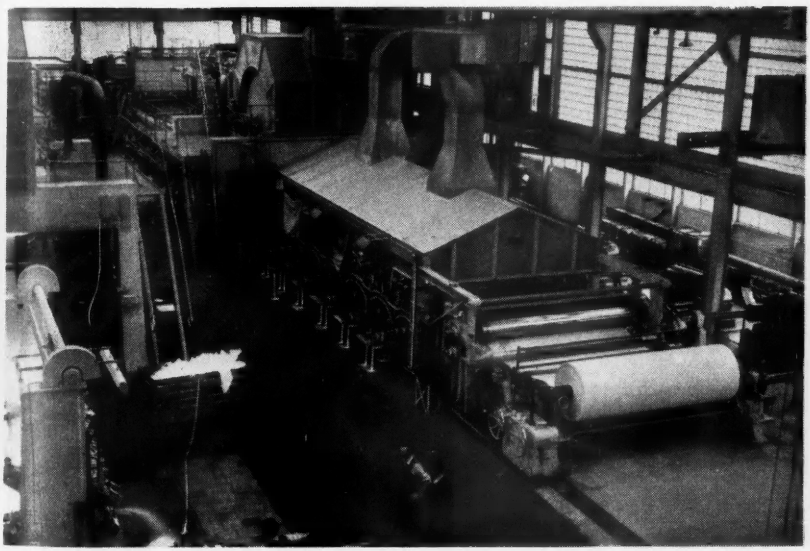
charging and control gear were provided by Tifé Batteries, Ltd.

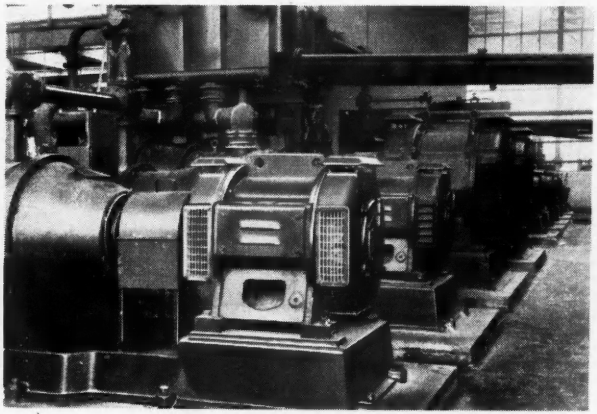
The substation is protected against possible fire risks by Pyrene automatic CO fire extinguishing apparatus and is kept at an even temperature with the aid of G.E.C. tubular heaters.

From the substation p.i.l.c. s.w.a. cables are taken, supported on walls, or from the ceiling of the basement, to sub-distribution boards which include h.r.c. switch fuses made by Parmiter, Hope & Sugden, and thence to the various starters and motors in the mill. Bill switch fuses, distribution boxes and switch sockets are used for the lighting and portable appliances, Walsall 60 A switch sockets being employed for welding equipment. Altogether over $3\frac{1}{2}$ miles of l.v. cable has been installed as well as almost a mile of 11 kV cable, all manufactured by Aberdare Cables, Ltd. Smaller sub-circuits (for motors below 25 h.p.) and all the wiring for the lighting scheme and other control and auxiliary circuits have been carried out in Pyrotenax cable of which over 25 miles in various sizes has been installed.

Operating continuously day and night seven days a week and producing approximately 250 tons of paper a week, the mill has at present a weekly electricity consumption of over 2 million kWh with an average demand between 75 and 80 per cent of the maximum demand of about 1,800 kVA (recorded on a Ferranti m.d. meter). Unity power factor is achieved by the use of synchronous induction motors on the main drives. Altogether the connected load is about 4,500 kVA, the bulk of which is represented by the 270 or so motors installed, ranging in size from $\frac{1}{4}$ h.p. to 500 h.p. With a very few exceptions the motors throughout the mill are of Metrovick construction; the air break type starters, most of which are direct-on-line, and some automatic contactors, were manufactured by M. & C. Switchgear, Ltd., and it speaks well for their design that they can stand up satisfactorily to continuous work for 168 hours a week, particularly in a few cases where, under automatic control, they are required to operate as often as four times a minute and never less than once in three minutes.

Except for the initial operation of preparing the stock, namely the treatment of the wood pulp in "Hydrapulpers," the whole process of manufacturing the paper is continuous. Three completely self-contained paper making machines (Bentley & Jackson) have been installed with space for a fourth. The largest machine, known as "Jack," has an output, at about 700ft of paper a minute, of 1 ton an hour of tissue





Motors driving Morden and Jordan refiners

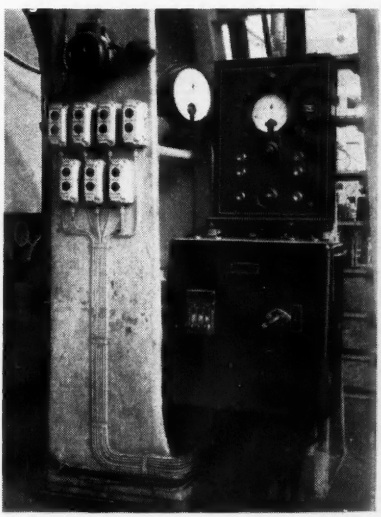
and is used to produce unglazed tissues, toilet paper and also crêpe paper. Machine glazed paper is made on the second machine ("Jill") of similar output, while "Baby," a much smaller unit, produces fine tissue at a rate of 150–200ft a minute or about ¼ ton an hour.

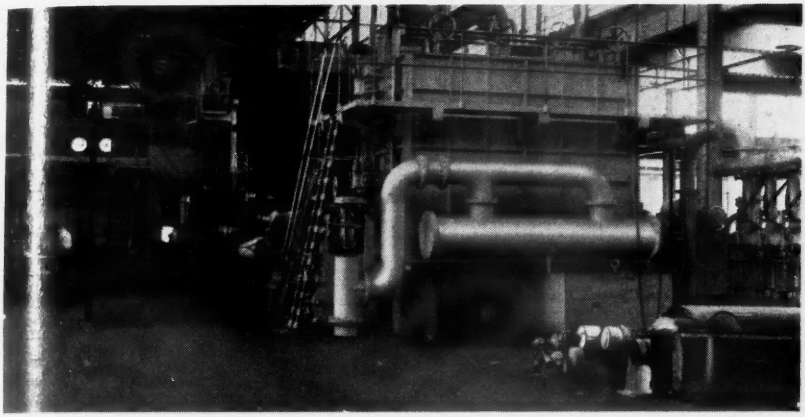
Contrary to usual practice, no beaters are used in the preparation of the stock, except for the breaking up of waste material for repulping. The wood pulp in 3–5 cwt bales is brought from the raw material stores by means of a 1½ ton overhead crane (Vaughan) and fed six bales at a time, together with colouring matter and 6,000 gall of water, into one of the two "Hydrapulpers," which are driven by 125 h.p. 730 r.p.m. motors. In these machines, which are in the form of large vats with serrated discs revolving in the vortex at the bottom, the fibres of the pulp are pulled apart and mixed with the water to form "slush," the operation taking about 20 minutes per batch. The slush is then transferred by a pump (25 h.p. motor) to the "stuff chest," where it is stored under constant agitation until required.

From here the process is continuous. The "half stock," as the material is now called, is pumped through Morden refiners (120 h.p. 960 r.p.m. motors) which incorporate two concentric cones of bars, the pressure between which is adjustable. The type of paper produced depends on the amount of work done by these machines and this is accurately assessed by fitting the squirrel cage motors with recording wattmeters. For some grades Jordan refiners (150 h.p. 200 r.p.m. motors) are also used. The stock is then passed through "Dirtec" cleaning apparatus (incorporating 40 h.p. Mather & Platt pumps), being pumped into a tube tangentially so that the heavy dirt drops to the bottom and is removed, while the clean stock is pumped to the head box of one of the paper machines.

At this point the stock contains only one ton of fibre for every 400–500 tons of water. In the head box the fibres are distributed evenly through a long slit at the bottom on to a continuous wire belt (which for the two big machines is 11ft 9in wide and 87ft long), it being important that the speeds of the belt and the fibre as they meet should be approximately the same. The wire, which is supported on the breast-roll at

Panel which controls the speed and the tension on the paper between the drying cylinders; also one of the Lockheed hydraulic control panels



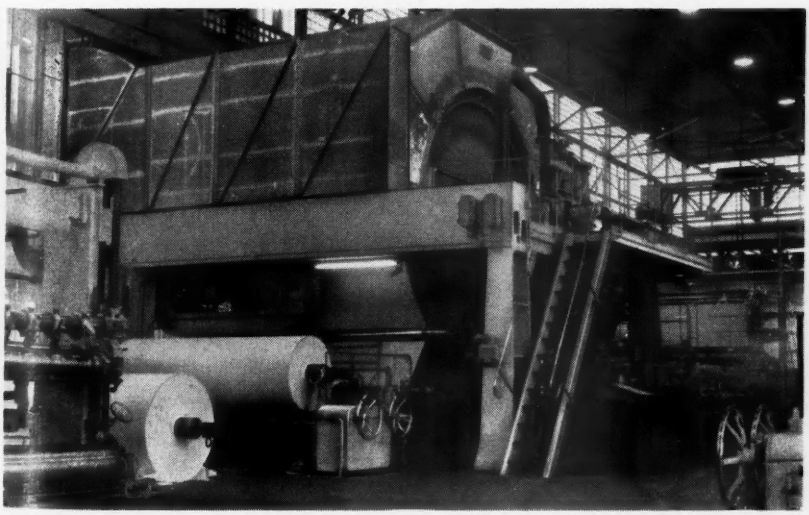


The wet end of the " Jill " paper making machine

the headbox end, is constantly shaken from side to side, the stroke being adjustable for length by mechanical means and for frequency by means of a variable-speed motor.

The process of removing water from the film of paper is carried out progressively by free drainage through the wire mesh, by suction boxes and then by passing the paper over the vacuum couch roll, which is 60 per cent perforated, before it is transferred to the continuous felt belt. Water is squeezed out by rolls to the absorbent felt and is sucked away through suction boxes by Sulzer vacuum pumps (65 h.p. motors) situated in the basement. The felt guides, operated by photo-electric cells, are interlocked with the drive motors so that they operate only when the section is running. Up to this stage the " Jack " and " Jill "

The 15ft 6in diameter machine glaze cylinder of the " Jill " machine



machines are identical in operation. Now in the "Jill" machine, the film of paper goes through presses or pairs of rollers in order to squeeze out further water preparatory to glazing on a heated cylinder 15ft 6in in diameter, 12ft 6in face width and weighing 60 tons. The surface of this roller is ground and polished with chalk to obtain a mirror finish. In the "Jack" machine the film of paper goes through two presses and then over a machine glaze cylinder 12ft 6in in diameter. From here it can be crêped half dry if desired, or run straight on round eight 4ft 6in diameter heated drying cylinders and through a calender.

Both the glazing and drying cylinders are internally heated by steam, and hot air is circulated round them externally by fans, extract fans also being used to remove moisture laden air. Dampers controlled by dry and wet bulb thermometers regulate the proportion of fresh and recirculated air. The Carrier-Ross Engineering Co., Ltd., which installed this hot air circulation plant, was also responsible for a heat recovery plant provided in connection with the hot water used for cleaning the felts.

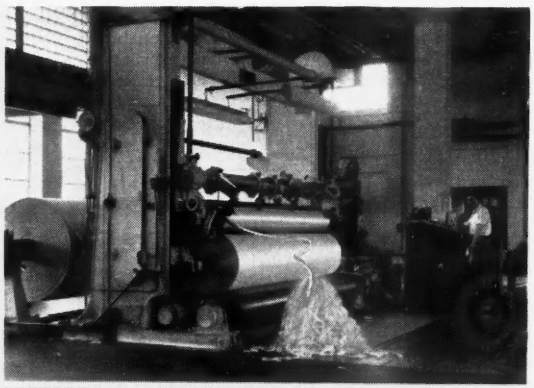
A single 175 h.p. motor drives the whole of the "Jill" machine, but in the case of the "Jack," with the necessity to run the sections at different speeds to achieve crêping, a 275 h.p. unit drives the portion of the plant up to and including the machine glaze cylinder and a 100 h.p. motor the remainder.

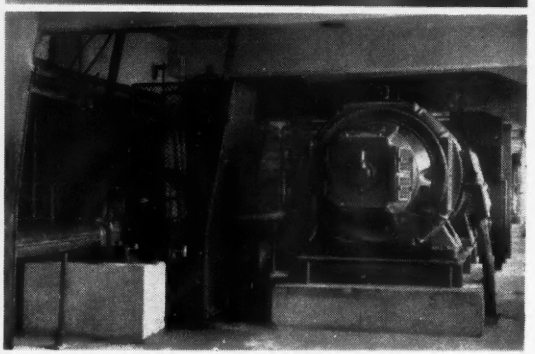
By means of a system of Ward-Leonard control it is possible to vary the paper speeds of the machines from 50 to 1,200 ft/min, with, in the case of "Jack," the dry end motor (the 100 h.p. unit) running at from 50 to 105 per cent of the speed of the wet end motor (275 h.p.). The fields of the two motors are controlled independently by means of a "Metrolock" electronic device which automatically corrects any tendency for the speed to vary. As already mentioned, the rotors of the main drive motors, which are direct coupled to the Ward-Leonard generators (500 h.p. in the case of "Jack" and 240 h.p. in the case of "Jill") are over-excited and controlled from the substation, to improve the power factor of the whole mill.

The "draw" or tension on the paper between the various drying cylinders is regulated by cone pulleys, the belt position being controlled by Lockheed hydraulic gear with remote electrical control which is interlocked. Electro-hydraulic control is also used for regulating the water supply and other purposes. Elliott instruments provide means of supervising the processes, speed recorders for each of the three machines being situated in the manager's office with indicators elsewhere.

The "Baby" machine operates very similarly to the larger units but, instead of utilizing a long continuous wire belt, forms the sheet on a cylindrical mould running in a vat.

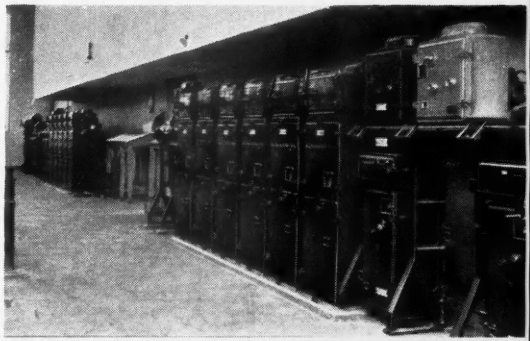
The slitting and rewinding machine for the "Jack" plant

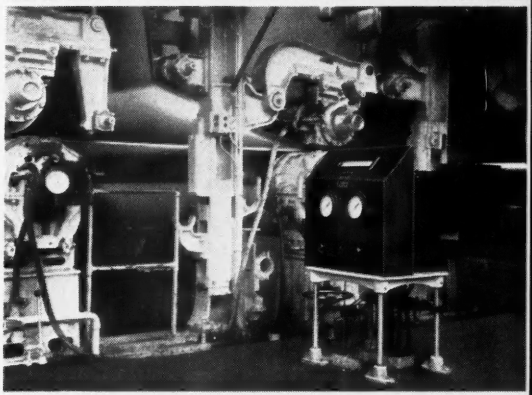




The synchronous induction motor of the W.L. set which drives the "Jack" machine

Motor control gear for the stock preparation plant is shown on the right (top)





The lower illustration shows pressure rolls on "Jack" machine and compressed-air control panel

The Ward-Leonard system is also employed for the speed variation of the 36 h.p. motors of the two Walmsley slitting and rewinding machines which deal with the output of the "Jack" and "Jill" machines at a speed of 3,000 ft/min. B.T.H. equipment is used in this case. The rewinder for the "Baby" machine has a 15 h.p. a.c. commutator motor with speed variable from 55 to 1,655 r.p.m.

In the finishing end section various other machines have been provided for final cutting and for the packing of paper handkerchiefs into cartons.

To provide the large quantity of water required for process work three 30,000 gall/hr Mather & Platt pumps (20 h.p. motors) in an unattended pumphouse give a continuous supply of 60,000 gall/hr, one pump serving as a standby. The water comes from the River Llynfi through rotary screens driven by two-speed motors, the debris being returned to the river lower down. The pumps are automatically controlled by Evershed & Vignoles "Noflote" switches in a filtration plant where chlorine and alum are added. After treatment the water is pumped by three further 30,000 gall/hr pumps to a 60,000 gall overhead storage tank on the roof of the office block in the mill. Float switches are again employed to control the feed to this tank, the level in which is indicated by means of coloured lamps. Other electrically operated equipment, used in connection with the water supply, includes air compressors for cleaning the filter beds. Thermostatically-controlled G.E.C. unit heaters have been installed in both the pumphouse and filtration plant, in order to guard against freezing up in very cold weather.

As will already have been gathered, considerable attention has been paid to preventing interference with the continuous flow of production by the failure of individual units of the plant. Each machine has its own separate electrical feeder and all the essential services, which include pumping, compressed air supplies, condensate return, Streamline oil filtration plant, overhead cranes, etc., are arranged so as to receive alternative electricity supplies from any one of the three transformers.

Lighting Arrangements

Special care has also been paid to the artificial lighting, not only with regard to quality and intensity throughout the mill, but also to ensure maximum continuity. The circuits have been divided up so that approximately 75 per cent of the lighting is fed from one end of the main switchboard, while the remaining 25 per cent takes its supply from the opposite end which is fed from a different transformer. Furthermore, a certain amount of emergency access and safety lighting is provided by the substation battery. Thus in the event of the failure of one of the transformers at

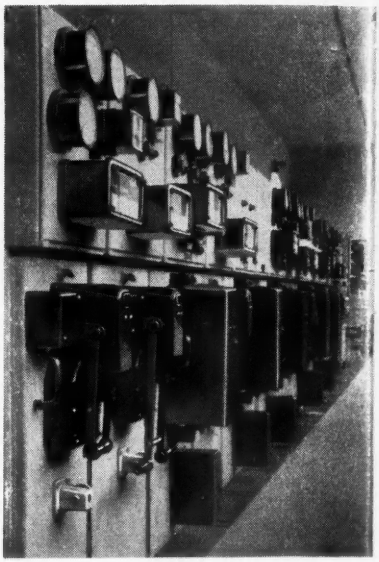
night or a complete shutdown of electricity supply the mill would not be in complete darkness.

The comprehensive lighting scheme was designed by the General Electric Co., Ltd., in conjunction with the consultants, G.E.C. fittings and lamps being used throughout. The main stock preparation area and the paper machine house are lighted by high bay units (500 W lamps), supported at roof truss level in order to clear the cranes. An average intensity of 15 ft-candles is obtained at working level in the machine house, an even higher intensity being employed in the mechanics' shop, where accurate maintenance work on the paper machine parts is done, and in the finishing end and office block. A certain amount of fluorescent lighting has been installed, notably under the hoods which cover the drying cylinders, in the laboratory and inside the hood of the cooking equipment in the canteen kitchen. Colour matching fluorescent lamps are fitted over the "Hydrapulpers" where the final colour of the paper is determined. The finishing end is lighted in the main by 500 W, 300 W and 200 W lamps in dispersive type vitreous-enamelled reflectors.

The approach road to the mill, which includes a private railway siding, is lighted by eighteen 500 W lamps in G.E.C. "Oxford" lanterns, supported at 25ft from the ground on reinforced concrete standards supplied and erected by Concrete Utilities, Ltd. The standards are connected by a six-wire overhead line, which provides for differential switching and also carries power and lighting supplies to the three all-electric houses occupied by the senior staff of the mill.

Generous provision of socket outlets has been made in the laboratories where the electrical equipment includes pH meters, photo-electric comparators, constant temperature tanks, centrifuges for making standard sheets, pulp ovens, hotplates, fume cupboards, beaters and mixers and micro-photography apparatus.

For the equipment of the kitchen Benham & Sons, Ltd., have provided two baby ovens, three ranges, another oven with five hotplates, a fish fryer, a stockpot, a grill, a Metcalfe slicing machine, an Imperial Machine Co.'s "Victoria" potato peeler, a Hobart mixer, a Peerless dishwasher, and a J. & E. Hall refrigerator. An electric clock system (English Clock Systems, Ltd.)



Substation showing l.v. switchboard in the foreground with 3,000 A solenoid-operated circuit breakers and e.h.v. board at the far end

comprising a master and slave dials has been installed. A Bennie lift serves the five floors of the office block and canteen.

Besides serving the actual paper making plant, the steam and electricity supplies combine to ensure comfortable and satisfactory atmospheric conditions inside the mill buildings by means of Carrier Ross automatically controlled air conditioning units, "Satchwell" thermostats being used to actuate the steam valves.

The whole of the electric power installation described above was supplied and installed under the supervision of the consulting engineers, J. D. Crozier & Partners, Ltd., who were also responsible for the general design of this part of the installation, in conjunction with the paper mill engineers. They also designed and supervised the steam supply arrangements in collaboration with Ewbank & Partners, Ltd., who represented the B.E.A. The complete electrical wiring installation, including erection of all lighting fittings and the overhead line, was carried out by Holliday Hall (Western), Ltd., who also installed and connected the Lockheed hydraulic control systems.

VIEWS on the NEWS

By REFLECTOR

REEFTON, in New Zealand, has the distinction of having been the first town in the Dominion to receive a public electricity supply. This information is obtained from an entertaining book, "Electrical Development in New Zealand," by H. J. Beeche, which I have just been reading. The author records that in 1886 a certain Walter Prince arrived in the town (then in the hey-day of the gold-mining boom) with a 1 kW dynamo, said to be of his own manufacture. He arranged to have the dynamo belt driven from the steam-engine of a brewery, carrying the conductors underground to a nearby hotel, part of which, in the presence of an interested and expectant assembly, he illuminated. The test required regular visits of the spectators between the hotel and the brewery and it is said that there was "a maximum demand at each point of supply."

* * *

Even in the earliest days of electricity supply in New Zealand there were regulations, one of which was that the carrying capacity of a fuse must be less than that of the wire it was intended to protect. However, the word "fuse" was variously interpreted. Mr. Beeche relates that at Reefton they were of the home-made type, to wit, clothes pegs. "These," he says, "were split down the middle, tacked to the wall with a brad through the centre and a boot tack driven partly home at each end. The circuit wires were then affixed to the boot tacks, and the gap between was bridged with fuse wire. . . ." In the circumstances it is not surprising that New Zealand has since enforced rather stringent regulations.

* * *

At a recent inquest into a death by electric shock received from a cooker a West Country coroner said that "considering how dangerous electricity is, it is a marvel that we don't get more accidents of this kind." This is not very logical: if accidents are so few surely the deduction should be that electricity is not dangerous. Most cases of electric shock are due to the victims' own negligence or foolishness, as in the cases of bathroom fire fatalities. The safest devices can be lethal in the hands of some people whether they are electrical or not.

* * *

"Wrathful" in the Glasgow *Evening News* threatens drastic action. He says that if the South West Scotland Electricity Board increases its charges, as proposed, he will use no further electricity. He hopes that other householders will do likewise. I cannot think that he will have much of a following or that he himself will do without electricity for long. The electrical habit is not so easily broken.

* * *

Strange phenomena are sometimes reported when an electricity leakage occurs. At Wigton, Cumberland, says the *Daily Dispatch* (Manchester), workmen have "quietened down" a pavement by renewing electrical equipment in the vicinity. Before this whenever there was rain "shoppers jumped and dogs howled" as they walked on the pavement in question. Better still, it is said that "a workman made a low consumption lamp light by merely putting it on the footpath."

* * *

I wonder if the *Times Pictorial* has dealt fairly with the work of Mr. Franz Schwatschke, of Carlow, in describing the ingenious electrical devices this gentleman is using in his home. The newspaper says:—

> "If he wants to listen to the radio, Mr. Schwatschke turns on the cold water tap in his kitchen. If he wants a new leg for his table, he plugs in his special electric tool-box; if he wants to light a cigarette, he just leans towards the table lamp."

Apparently power for the radio set is provided by a "miniature 'Shannon scheme' fixed to the tap."

PERSONAL and SOCIAL

News of Men and Women of the Industry

IT is announced that **Sir Robert Watson-Watt** has been appointed by Mr. Claxton, Canadian Defence Minister, as adviser on radar and electronics to the Canadian Defence Research Board. He will remain governing director of Sir Robert Watson-Watt & Partners, Ltd.

Mr. C. K. F. Hague, deputy chairman and managing director of Babcock & Wilcox, Ltd., is resigning from the Ministry of Supply Engineering Advisory Council, following his appointment as deputy chairman of the newly formed Royal Ordnance Factories Board.

The following appointments have been made to the administrative staff of Moulded Products, Ltd., an associate company of British Moulded Plastics, Ltd. **Mr. A. E. Curtis** becomes commercial manager, **Mr. W. D. Wilkinson** is appointed production manager, and **Mr. W. J. Fluckiger** will become sales manager. In addition, **Mr. J. H. Ireland** is rejoining the company and will act as assistant to the works director.

On 27th March the directors of Falk, Stadelmann & Co., Ltd., entertained at dinner eight employees who left the company's service on 31st March. In addition another employee was entertained to celebrate on that evening the completion of fifty years' service with the company. Among those entertained were: **Mr. H. Perkins,** a senior representative, who has served the company in many parts of the country, more especially in the Eastern counties; **Mr. A. O. Wing,** who has been with the company for forty-eight years in the Electric Light Fittings Department, and received his initial training under Mr. E. Bernard who retired two years ago; **Mr. A. Standing,** forty-five years' service, who has been office manager in the Manchester branch; **Mr. W. C. Jeary,** aged seventy-six years, who has served Falks for twenty-three years and has been manager of the West End branch in Mount Street since its inception. Until the end of the war, Mr. Jeary was manager at Falks' Farringdon Road showroom. He is succeeded by **Mr. A. Craven,** who has been transferred from the company's Leeds branch.

Mr. W. C. Jeary

Mr. H. Perkins

To mark his completion of forty years' service at the Sheffield district office of the British Thomson-Houston Co., Ltd., the manager, **Mr. C. A. Russell,** has been presented with a portable typewriter and a scroll bearing the signatures of the subscribers. The occasion was a B.T.H. staff dinner-dance at the Grand Hotel, Sheffield, on 25th March, at which about one hundred guests were present. The presentation was made by Miss E. Hensman, chief clerk.

Mr. H. L. Schuster, formerly technical manager with Electro-Methods, Ltd., has recently taken up the position of general manager with Measuring Instruments (Pullin), Ltd.

The Council of the Institute of Fuel has awarded the Melchett Medal for 1952 to **Professor D. T. A. Townend,** D.Sc., Ph.D., D.I.C., Hon.M.Inst.Gas E., F.Inst.F., in recognition of his outstanding contributions to the science of combustion, particularly in the field of higher hydrocarbons. Dr. Townend is the Director General of the British Coal Utilization Research Association; he was formerly Livesey Professor of Coal Gas and Fuel Industries in the University of Leeds, and president of the Institute of Fuel for 1948-50.

Mr. Felix L. Levy, a director of George Cohen Sons & Co., Ltd., and its associated companies, has been elected president of the London and Southern Scrap Iron and Non-ferrous Metal Merchants' Association.

Long service certificates were recently presented to three Devon employees by Mr. S. F. Steward, C.B.E., chairman of the **South Western Electricity Board.** They are Miss E. L. Willcocks and Mr. T. N. I. Adams of Plymouth, and Mr. E. R. Giles of Torbay. Making the presentation, Mr. Steward said that the success of the electricity supply industry was dependent on the work put in over the past forty years by such loyal employees as these.

At the recent I.E.S. "Brains Trust" meeting

Mr. **C. M. Cock**, M.I.E.E., general manager of the Traction Department of the English Electric Co., Ltd., has been elected president of the Institution of Locomotive Engineers for 1952-53.

Mr. **B. Leigh** and **Mr. W. A. Anderson** retired from Metropolitan-Vickers Electrical Co., Ltd., at the end of February, having served for many years on the London office staff. Mr. Leigh had had fifty years' service, having joined the Manchester office of the British Westinghouse Co. in 1902, at which time the Trafford Park works was still unfinished. He later transferred to the export side of the organization and, after a period as representative in Italy, he took part in setting up a London traction bureau to co-ordinate the various Westinghouse activities in Europe. He has been with the Traction Department ever since.

Mr. Anderson had been with the company for forty-three years. He started at Trafford Park, joining the British Westinghouse Meter Department in 1909, and in the following year he was appointed meter sales engineer for the south of England. Among Mr. Anderson's responsibilities was the meter test equipment which was set up in London at an early date and later expanded considerably.

About 300 people spent an enjoyable evening at the Masquerade Ball held by the **British Thomson-Houston (Willesden) Apprentices' Association** at Victoria Halls, London, W.C.1, on 1st April. After the unmasking ceremony the competition for the ballroom queen was won by Miss Jackie Miller who received a silver cup and a pair of nylons. Presents were also given to the enterprising winners of the fancy dress parade for the most original and best costumes. Dancing continued to the music of Reg. Carter and his orchestra and there were several spot prizes.

On 26th March the **Illuminating Engineering Society** held a "Brains Trust" meeting with Mr. Kenneth Horne (the radio artist) as question master. We reproduce a photograph taken on the occasion showing (left to right) Mr. C. W. M. Phillips, manager of the B.T.H. Lighting Department; Mr. S. S. Beggs, of the G.E.C. Research Laboratories; Mr. Kenneth Horne; Mr. L. G. Applebee, director, Strand Electric & Engineering Co., Ltd.; and Mr. E. C. Lennox, manager, West Sub-Area, North Eastern Electricity Board.

Mr. W. M. Furniss, chairman and managing director of the Electric Construction Co., Ltd., Wolverhampton, has been appointed a member of the Midland Regional Board for Industry.

Mr. H. F. Sherborne, M.A., a director of the Yorkshire Copper Works, Ltd., Leeds, and a member of the Yorkshire Electricity Board, has been appointed general manager of the company.

Mr. S. F. Smith, Associate I.E.E., head of the Electronic Instruments Department, Philips Electrical, Ltd., has been awarded the Bessemer Premium by the Society of Engineers for his paper on "Electronic Instrumentation as applied to the Study of Vibrations in Industry."

Lord Citrine presented trophies and plaques to the winners in the British Electricity Ambulance Centre national first-aid competitions at the Central Hall, Westminster, on 2nd April. The winning women's team was from

Lord Citrine presenting the trophy to Miss O. J. Napper, captain of the Mid-Sussex women's first-aid team

Mrs. H. L. Smith presenting challenge cup to Mr. R. W. Roper at the dance of the Benjamin Electric Sports and Athletic Club

The Sports and Athletic Club of the **Benjamin Electric, Ltd.**, held a presentation dance at the works canteen, Tottenham, on 29th March. Mr. H. L. Smith, a director of the company and chairman of the Club, was present with Mrs. Smith who presented the challenge cups and prizes for the various sporting events held during the winter months. In the accompanying picture Mrs. Smith is seen presenting Mr. R. W. Roper with the cup for winning the individual snooker championship. Mr. Smith is seen on the left of the picture.

Mid-Sussex (South Eastern Area) and the successful men's team was from Worthing, also in the South Eastern Area.

Mr. W. W. Syrett, export sales manager, E. K. Cole, Ltd., has been elected chairman of the B.R.E.M.A. Export Policy Committee.

Professor David Cass-Beggs, who is an expert on hydro-electric power, has announced that he is resigning his position at the University of Toronto to become a professor in the University of Wales. He is associate professor of electrical engineering at the University of Toronto.

Mr. O. A. Sherrard, who until electricity supply nationalization was secretary of the Central Electricity Board, is the author of a book on the elder Pitt (the Earl of Chatham) to be published in June by John Lane, the Bodley Head, Ltd.

Following the appointment of Mr. R. F. Winder, M.I.E.E., as district manager, Hendon, of the Eastern Electricity Board, **Mr. F. J. Drake** has been appointed district manager of the merged districts of Hertford and Royston in the Northmet Sub-Area of the Board. He was previously district manager of Royston for 21 years, going from Stevenage, where he was first assistant to the Stevenage Electric Light & Power Co.

Mr. Hector V. Slade, M.B.E., T.D., A.M.I.Mech.E. (deputy managing director, Garrard Engineering and Manufacturing Co., Ltd.) has been elected chairman of the Radio and Electronic Component Manufacturers' Federation in succession to **Mr. W. F. Taylor** (Telegraph Condenser Co.). The vice-chairman is **Mr. P. D. Canning** (Plessey Co.) and treasurer **Mr. C. M. Benham** (Painton & Co.).

Over 900 guests from the motor and radio trades in the North-West attended the Manchester Free Trade Hall on 26th March, for a ball and cabaret arranged by the Exide and Drydex depot in the city.

Mr. T. White Wilson, executive director of the **Plessey Co., Ltd.,** recently opened the company's new Social Club premises at Cricklade Road, Swindon. The building, which has a main hall capable of accommodating some two hundred people, provides facilities for indoor recreation for the 2,700 employees of the Swindon works.

The **Chief Technical Assistants' Association** held its 37th annual dinner on 4th April at Kettner's Restaurant, London, W.1. Among the principal guests were Messrs. E. A. Mills (deputy chairman, London Electricity Board), H. C. Wells (engineering adviser, Chief Engineer's Dept., London Electricity Board), J. L. Moss (president, Electrical Power Engineers' Association), L. H. Welch (manager, Western Sub-Area, London Electricity Board) and E. B. Sawyer (manager, Lighting Service Bureau). The chairman of the Association, Mr. H. C. Rudd, presided.

On 2nd April the Southern Area of **L.E.S.S.A.** (the social organization of the London Electricity Board and the London Division, B.E.A.) held a "square dance" at the Beckenham Public Hall. About 140 attended; music was provided by the Kent Cobs and the "caller" was Mr. F. Hawkins.

OBITUARY

Mr. H. Morehouse.—The death occurred on 2nd April at the age of fifty-three of Mr. Harold Morehouse, Manchester regional manager of Philips Electrical, Ltd. Mr. Morehouse was formerly branch manager at Liverpool and Leeds.

Mr. W. R. Steele.—The death occurred on 1st April at the age of sixty-seven of Mr. William Robert Steele, M.I.M.E., M.I.E.S., A.M.I.E.E., M.I.P.I., of Lee-on-Solent.

Space Warming

Houses Should be Designed for Electric Heating

In an integrating paper presented before the Institution of Electrical Engineers (Supply Section) on 3rd April, Mr. D. H. Parry (East Midlands Electricity Board) discussed means by which the persistent public demand for electric heat could be met without excessive loading of generating plant and unduly heavy coal consumption.

Taking the Egerton and Simon Reports as a starting point, he emphasized that fuel consumption for domestic heating depended primarily on heat losses from buildings and only secondarily on the efficiency of appliances. Warm air gave poor temperature distribution, but radiation produced more comfort with lower losses.

For modern closed solid fuel stoves test-bed efficiencies of 60 to 70 per cent were claimed against 20 to 30 per cent for modern open fires, but the former values were obtainable only with continuous operation at rated output; otherwise the open type was more efficient. Closed stoves distributed heat mainly as warm air, which was not so effective as radiant heat and was slow to become apparent. Moreover they needed good low-volatile fuel of doubtful availability in the amounts that would be required for extensive use.

Electrical Methods

The relatively low production efficiency of electricity was compensated for by the burning of low-grade slack useless for other purposes, the quantity of which tended to increase as thicker coal seams became exhausted and mechanized mining increased. Electric heat, however, made a heavy demand on generating plant which in severe weather might reach 25 to 30 per cent of the total load. For less than one hour's use, the coal economy of high temperature electric radiators was superior to that of any other method, but could be improved, for instance, by developing infra-red filaments in vacuum tubes with gold-plated or silvered reflectors. For continuous heating low-temperature radiation only from thermostatically or time-switch controlled elements embedded in the floor gave a suitable temperature of 75 deg F at 10 W/sq ft.

Ventilation losses (only one change of air an hour being required) could be reduced by fans combined with heat regenerators, particulars of which were given. Thus wall and ceiling temperatures of 60 to 65 deg F could be maintained under all winter conditions with adequate thermal insulation. All future houses should be designed for better thermal insulation than that proposed in the Egerton Report. If the heat transfer coefficient were 0·075 B.Th.U./sq ft/hr instead of 0·24 overall, only 2·5 tons of coal need be burned per annum with electricity. This amount compared with 2·75 tons with the direct use of coal or coke, which would reach 3·5 tons under Egerton standards.

Time Switch Control

Comfort in a house having low thermal loss and heated by continuous low-temperature radiation was not noticeably impaired by interruptions of electricity supply for a few hours and the load could be removed from the peak by time switches. By this method the yearly fuel consumption of 46 million tons of the Egerton Report could be reduced to 33 million tons for 13 million houses. The above results were confirmed by experiments carried out at Leicester and compared with results obtained at Abbots Langley.

In considering designs for an all-electric house, the author showed examples of possible wall construction and suggested that the structure might consist of a concrete shell lined with laminations of building board and aluminium foil enclosing a large number of air spaces.

The net addition to the cost of a typical municipal house adapted to all-electric heating would be 4s 1d a week, but the value of time saved would be considerable. Demands, consumptions and costs of three

kinds of municipal houses were tabulated:—(1) with a heat-transfer coefficient of 0·24 solid-fuel background heating with electric topping up; (2) as (1) but with electric convectors for background heating; (3) with a heat transfer coefficient of 0·075, electric floor heating, controlled ventilation and regeneration. Yearly m.d., consumption and load factors would be: (1) 4·5 kW, 4,100 kWh, 10·4 per cent; (2) 9 kW, 18,500 kWh, 23·5 per cent; and (3) 1·6 kW, 5,100 kWh, 36·4 per cent.

The author in conclusion urged the undertaking of large-scale research upon the construction of houses with low heat loss suitable for warming by electricity.

DISCUSSION

Prof. F. E. Simon (Clarendon Laboratory) said that in twenty years' time we must have at least three times our present generating capacity if we were to remain a leading industrial nation. We had therefore to prevent wastage of fuel and make the best use of our generating capacity. Shift work in industry would have to come, but would be rendered more difficult if a great part of the present valleys in the load curve were filled by heating load. District heating with back pressure turbines was, in suitable situations, to be preferred to direct electric heating and consideration should be given to the heat pump.

Mr. Forbes Jackson (L.C.C.) said that there should be a return to promotional tariffs. If people wanted electric heating they should be allowed to have it, but should pay more for it.

Mr. W. F. B. Shaw (Fuel Research Station) contended that the section of the paper dealing with solid-fuel appliances contained a number of errors. Test-bench efficiency was not a figure by which the utility of an appliance in a house could be judged; it was solely a means by which appliances *in the same category* could be compared.

Mr. R. H. Rawll (London Electricity Board) quoted the late Dr. Ferranti as saying in an address to the Institution over forty years ago that electricity for lighting, cooking, power and traction must be supplied as and when required. On the other hand domestic heating would be done largely through the medium of heat storage and was therefore a controllable form of demand. The Institution and its members must play an increasing part in realizing Ferranti's ideal and promoting electric heating.

Dr. J. C. Weston (Building Research Station) remarked that the author had assumed one air change an hour with electric heating, but his only hope of getting that was to have no openable windows or doors. The Simon Committee's conclusion that in winter the main space- and water-heating load should be carried by solid fuel remained valid.

Mr. J. I. Bernard (E.D.A.) mentioned that in 1940–50 domestic coal consumption had been reduced by rationing by some 15 million tons while the consumption of coal in power stations attributable to domestic cooking and heating had increased by only 4 million tons, although during that period the number of occupied houses increased by over a million.

Miss M. V. Griffith (E.R.A.), emphasizing the importance of insulation of the house, said that in E.R.A. tests on floor heating installations it had been found that to maintain an air temperature of 63 deg F with an external ambient temperature of 40 deg F, the floor temperature had to be kept at 90 deg F in an uninsulated building, while in an insulated building 75 deg F was sufficient. The main advantage of electric floor heating was that if it was disconnected at peak hours the occupants did not suffer appreciable discomfort. The use of galvanized iron wire buried in concrete and run at low voltage was a cheap and effective means of floor heating which was being investigated. A considerable amount of work was also being done on the heat pump.

Mr. J. L. Rycroft (G.E.C. Research Laboratories) doubted whether the building constructions suggested by the author could be justified economically and said that in any case the effect of stray ventilation on fuel consumption did not seem to have been fully appreciated. Under present conditions winter background heating and water-heating loads might well be taken by a solid-fuel boiler, with electric heaters for topping up, summer water-heating requirements being provided by electricity. The overall combination would give an economic revenue to the supply industry. Electricity was more economical than solid fuel for heating rooms occupied intermittently and for water-heating in the summer.

Mr. P. Schiller (B.E.A.), while feeling certain that the use of electricity for cooking and water-heating was justified, had not been able to convince himself that the same was true of all-electric space heating. It was often overlooked that solid-fuel appliances would be used at a very low load and a very poor efficiency for most of the time. A national fuel policy could be decided only on the basis of realistic figures from masses of ordinary people.

Mr. A. E. Margolis (Kennedy & Donkin) maintained that much greater use could be made of electricity for heating, and much more coal could be saved by combining electric heating with district heating. The cost of a generating station suitable for use for district heating, with a steam pressure of 900 lb/sq in, was to-day less than that of a condensing station with its cooling towers.

Mr. E. M. Ackery (E.D.A.) suggested that electric floor heating did not produce the conditions the designer wanted. The only stable thing about it was the amount of energy put in; the surface temperature, air temperature, etc., would be decided by the room characteristics.

Electrical Supervisors

Annual Dinner and Reunion

PROPOSING the toast of "The Electrical Industry" at the annual dinner of the Association of Supervising Electrical Engineers on 4th April, Dr. S. F. Dorey (chief engineer, Lloyd's Register of Shipping) drew attention to the increasing linkage of electrical and mechanical engineering. He traced the use of electricity at sea from 1879 when the s.s. *Mendoza* had two arc lamps in its saloon. In 1884 a Parsons turbo-generator of 7½ kW was installed in another vessel. In 1903 there were five small electrically propelled ships; by 1939 the tonnage wholly dependent on electricity had reached 500,000 and by 1951 5½ million. To-day, in addition to power and lighting and heating, there were electrical depth sounders, steering gear, wireless and radar. Trouble experienced with welded ships built before 1945, due to too quick welding, had now been eliminated.

Electricity and Productivity

Sir John Hacking (deputy chairman, B.E.A.), responding, referred to the far greater degree of electrification required to maintain the country's industrial position, and said that no amenity was so important as electricity in the home. The commissioning last year of the record capacity of 1,113,000 kW had been possible through the ability of private manufacturers and the publicly owned supply industry to co-operate. There would be no difficulty in constructing 200,000 kW sets, but in view of the trend towards the one-turbine one-boiler combination 120,000 kW was the maximum envisaged. Load shedding might not be so well avoided next winter as this, when there had been a recession of load due to shortage of materials and export markets and change-over in tooling for rearmament. There was plenty of coal underground and we should not accept the position of inability to raise enough. Referring to criticisms of the electricity supply industry in Parliament and the lay Press, he said that while members of the public, who were in effect equity shareholders, had a right to express their views, they should show trust in those they had put in charge of their undertaking. Regarding new types of coal fires, the smokeless fuel required to give good efficiencies was not available and the bituminous varieties yielded much poorer results. In any case the public should be permitted to put in the appliances they preferred, whether coal, electricity or gas at prices that fairly reflected the cost.

The health of "Our Guests" was proposed by the chairman, Mr. A. G. Ramsey (immediate past president), who read a telegram from Mr. T. G. N. Haldane (president) regretting his absence owing to his being on a tour of Australia and New Zealand. The long list of eminent guests greeted by the chairman included six past-presidents of the Association. Mr. Ramsey paid a tribute to the constructive and helpful attitude of the technical Press and to its freedom from political bias and concluded by congratulating Mr. A. Brammer, the general secretary, on his election as a Companion of the Institution of Electrical Engineers.

Lessons from the Past

In response, Sir Arthur Fleming (director of research and education, Associated Electrical Industries, Ltd.) suggested that younger men would profit by a knowledge of the early days of the industry. He recalled some of his own experiences of the hard way at Deptford, where, as thirteenth engineer, he successively hand-fired the boilers and acted as greaser and switchboard attendant with particular reference to the avoidance of hot metal from melting fuses. There was also the mystification caused by the voltage at the receiving end of the Ferranti 10,000 V cables being higher than at the power station—a new phenomenon then. Sir Arthur illustrated his points by quoting some verses which he had read in the *Electrical Review* about fifty years ago.

Industry and the House

Uncertain Economic Policy

By T. F. COOK, M.P.

THE House of Commons is now getting into full swing and my recent forecast that there would be many late sittings is being fulfilled. The marathon sessions have still to come with the Finance Bill and the general opinion is that the present late sittings are valuable training for the main event.

In spite of sensational headlines the House has been fairly quiet, but it does appear to many that the Government's time-table is well behind schedule. Indeed, it started discussing the Army Act in Committee and this Act alone could keep the House fully occupied for months to the almost complete exclusion of all other business, but it has been agreed to send the Act to a small committee which will make recommendations to the House. One thing that does stand out clearly in all this is that in the Secretary of State for War, Brigadier Head, the Government has an outstanding Minister whose capacity is universally accepted.

Textile Industry Unemployment

By far the biggest problem worrying the House at the moment is the situation in the textile industry with substantial real unemployment and large-scale short-time working. It is not enough to say that there is a world slump in textiles: no real attempt seems to have been made to study the problem in this field. While our own industry is going through a very bad time the Japanese are expanding their markets. But if there actually is a world slump in textiles, then general slump conditions are sure to follow with disastrous consequences generally.

The decision of Australia to cut her Sterling Area imports is now having a staggering effect on our export trade to that quarter with no new outlet to take up the slack. There has been considerable adverse comment on the recent meeting of the Commonwealth Finance Ministers on this point. Most members ask why the conference did not decide to set up a committee of experts to examine the whole export-import policy of the members of the Commonwealth and Sterling Area with a view to concerted action to prevent the heavy drain on gold and dollar reserves. Their proposals could have been closely studied and then acted upon in the light of prevailing circumstances.

What seems to have been decided at the meeting is that every member country should act individually and cut its imports. The situation will be very much aggravated if India and Pakistan adopt the same methods. The House debated this question recently and concern for the future was brought out very clearly, but although the discussion was taken outside the realm of party politics the Government gave little or no indication as to how it proposed to tackle this serious situation.

With the second reading of the Finance Bill (which will of course take place before this appears in print) members on all sides of the House are hoping that the Chancellor of the Exchequer will intimate some modification of the "D" scheme designed to give some relief to the textile industry. It is generally felt that Mr. Butler should exempt a wide range of goods from purchase tax but the question confronting the House is, how far is he willing to forgo the revenue that the scheme is designed to bring in.

Excess Profits Levy

Another matter of interest to all members is what the Chancellor will do on the proposed excess profits levy. He has been under very great pressure from the Conservative members' finance committee. They argue that the pledge given in the Party's election manifesto related specifically to profits on armaments but the present proposals penalize those firms which have made an all-out drive to build up their export trade and his action is calculated to discourage them in their efforts.

Indeed, several quarters of informed opinion in the House are very much concerned with the fact that the Budget, on reflection, does not begin to tackle the major problem of the balance of payments. The House has as yet had no answer from Mr. Butler as to why he plumped for an early Budget which has delayed the issue of the Economic Survey (if it is to be published at all). This Survey is of tremendous help to the House and the country in assessing the situation.

There has been a greater demand than ever before for seats in the House of Lords as the result of the extra vigour recently shown in their Lordships' debates. Again, in the Upper House it has been indicated very clearly to members of the Commons that the main problem of the balance of payments is not being tackled with a view to presenting a clearer picture of the remedies. Little or nothing was said of the effect the new monetary policy was having on industry. Most members are asking whether we can have economic stability by monetary discipline alone and if it is wise to abandon the powerful weapon of physical controls. Future policy will have to be made clear to industry very soon. As things are at present a great many firms are in real difficulty over their future plans. A typical example is in the field of house building. With the restrictions on overdraft facilities, how can any building firm take on, as they have been doing, large contracts? So far, it appears that no decision has been made on this point but the matter is most urgent.

NORTH WALES WATER POWER

B.E.A. Bill Read a Second Time

THE North Wales Hydro-Electric Bill, promoted by the British Electricity Authority, received its second reading in the House of Commons on 1st April. Mr. Gower explained that the projects were contemplated by the North Wales Power Company, before the industry was nationalized, and the B.E.A. had carried on with them. The proposals were to extend the catchment area of the existing stations at Dolgarrog and Maentwrog and to construct a new hydro-electric system near Ffestiniog and also three related generating stations. The proposals involved an average annual output of electricity of 84·5 million kWh, and the new generating capacity was likely to be in the region of 45,500 kW. The average cost per kilowatt installed was estimated to be £94 5s and the overall cost per kWh sent out about 0·6d. The probable saving in coal was likely to be in the region of 55,000 tons per annum.

There were fears that the scheme would interfere with the amenities of the area and that water supplies would be subject to interference. Discussions had taken place between the B.E.A. and the National Parks Commission and the Minister of Housing and Local Government, and the promoters of the Bill would be prepared to accept amendments providing for proper planning control to protect not only the amenities and natural beauties, but also the disposal of soil, the appearance of the aqueducts and other works and the restoration of land affected by the works. Another fear was that the power would be used not for the benefit of North Wales itself but for other areas. It was true that power would be supplied to the grid, but most of it would be used in North Wales.

Mr. Nabarro, opposing the Bill, said that the scheme was extravagant and did not use the financial resources to the best advantage. All eight schemes ought to be considered together and as part of one plan. The total cost would be £30 million if the Nant Ffrancon and Snowdon schemes were excluded. If they were included the cost would be £40 million. For that £40 million there would be 300 MW of power available on installation. If, for example, the Connah's Quay steam power station was worked to its proper load factor of 80 per cent it would yield sufficient electricity for the whole of North Wales without any difficulty. Not only was the installation cost three times as high in a hydro-electric scheme as for a steam

station, but the use of the power was only one-third in a hydro scheme as compared with a steam scheme. That weighted the capital cost case against hydro schemes by something like ten to one.

With regard to coal conservation, there had been something of a "Dutch auction." The divisional controller of the B.E.A. said in the *Manchester Guardian* of 22nd December, 1948, that the eight schemes would save 500,000 tons. The same gentleman in the *Electrical Review* of 27th January, 1950, said the eight schemes would save 400,000 tons—he had pulled it down by 100,000 tons. The last Minister said that the coal saving would be 374,000 tons. Lord Citrine had written saying that the saving would be 252,000 tons. But when a calculation was made, based on a 28 per cent thermal efficiency of a new power station, the coal saving on the six schemes—excluding Nant Ffrancon and Snowdon—was only 182,000 tons. To save this coal the B.E.A. wanted to invest £30 million. That was sheer nonsense.

Mr. G. O. Roberts said that the Bill as at present drafted was unacceptable. It would damage irreparably the natural beauty of one of the loveliest parts of Wales.

Mr. Raikes said he understood that the Authority was ready to meet objections in a reasonable way in committee.

Mr. Noel-Baker, former Minister of Fuel and Power, said that the three schemes proposed in the Bill were not open to serious objection if they were carried out in such a way as to protect the natural beauty.

Mr. Clement Davies considered that whatever amendments might have to be made in committee, the general principles of the Bill should have unanimous support.

Mr. Geoffrey Lloyd, Minister of Fuel and Power, said that the capital cost of the Ffestiniog scheme was £3,325,000. For an equivalent steam installation the cost would be £2,328,000. The running costs of the hydro-electric scheme were £21,000 a year, and the running costs of a steam scheme would be £265,000 a year. The B.E.A. wished to put back into the Bill the ordinary planning clause which was a standard form of protection in private Bills; this was a more convenient and workable system than a special instruction or an amenity committee. The Government thought that in particular it should be obligatory on the B.E.A. to consult the Royal Fine Art Commission and the National Parks Commission about building or other works. If there was a dispute between the Authority and the local planning authority, there should be provision for referring this dispute to the Minister of Housing and Local Government and himself for decision.

The Bill was read a second time by 200 votes to 40 and, in view of Mr. Lloyd's assurances, motions instructing the committee to safeguard the amenities of Snowdonia were not proceeded with.

U.S. Visitors' Impressions

AT the conclusion of their tour of inspection of the electricity supply industry some of the members of the team from the United States (sponsored by the Anglo-American Council on Productivity) met Press representatives at the B.E.A.'s Wensley Street, London, premises on Friday last. The deputy-chairmen of the B.E.A., Sir Henry Self and Sir John Hacking, were present and the former introduced Mr. Chandler W. Jones (vice-president, Narragansett Electric Co.), leader of the team.

Mr. Jones said that in their tour the party had covered 2,600 miles and had visited all the Area Boards and B.E.A. Divisions as well as the undertakings of the North of Scotland Hydro-Electric Board. They had found British technical and engineering skill to be excellent and had gained some useful experience. He made particular reference to the B.E.A.'s coal researches and the methods of burning low-grade fuel which might have application in some parts of the United States.

Mr. Floyd L. Goss (Department of Water and Power, Los Angeles) considered that Great Britain was ahead of the United States in the design of underground cables and Mr. J. C. Falkner (Consolidated Edison Co., New York) said that he had been impressed by the use of aluminium roofing and glass sides in British power station construction.

Mr. Jones, answering a question, explained that the team was not concerned with forms of ownership; their investigation was purely operational and technical.

Rural Electrification

DURING a debate on farming policy in the House of Commons last week the Minister of Agriculture said that last autumn it had been decided that Electricity Boards should only spend £3 million instead of the £5 million they had allocated to rural electrification this year. The Government had now decided that they should spend £4 million which would make it possible for existing schemes to be continued and new schemes to be started.

British Radio Components

Survey of Ninth R.E.C.M.F. Exhibition

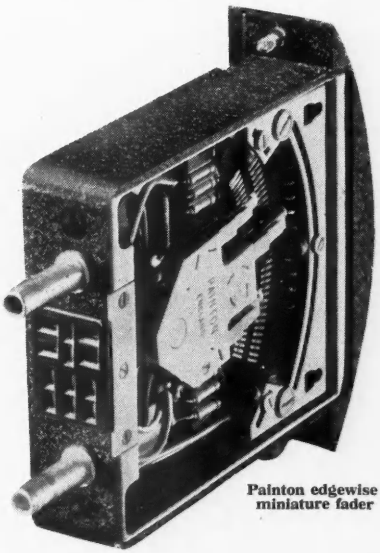
THE ninth annual private exhibition to be organized by the Radio and Electronic Component Manufacturers' Federation took place at Grosvenor House, London, this week (7th–9th April). Once again more than one hundred exhibitors displayed a very wide range of British made components, valves and test gear for the radio, television, electronic and telecommunication industries.

Each year this show brings new evidence of successful research by British component manufacturers to enable them to design and produce components which are increasingly reliable under extremes of atmospheric conditions, technically more efficient and, many of them, smaller in size. In spite of the defence programme, manufacturers can still meet demands for components for every need at home and abroad, including domestic radio and television. Shortages, however, are experienced from time to time and it is evident that supplies of certain new items are confined to Government use.

A major section of the exhibition was devoted to wires, cables and insulating materials. Here a new grade of p.v.c. compound, styled "VO," which can be used continuously at temperatures up to 150 deg C and retains its flexibility at that temperature, was shown in the form of sleeving by Associated Technical Manufacturers, Ltd. This firm also had a self-sealing p.v.c. tape for binding cables, and bi-coloured insulated wires, the helically striped section colour of which extends the colour-coding range. Another firm, H. D. Symons & Co., Ltd., showed heat resisting sleeving known as yellow varnished terylene which can be used instead of varnished glass fabrics for operating temperatures up to 150 deg C.

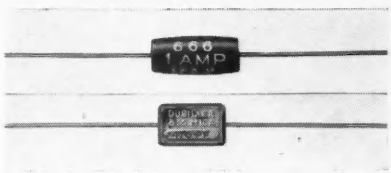
Enamelled wire weighing only one ounce for a length of over 3½ miles was shown among a very wide range of wires and special purpose cables by British Insulated Callender's Cables, Ltd. There was also a self-bonding wire, the ordinary enamel insulation of which is covered with an extra coating of thermoplastic material. Heat treatment after winding bonds together the adjacent turns of wire in a coil.

Ceramic insulators made from over six different types of material, each with special properties, were shown by George Bray & Co., Ltd., while about a dozen different grades of "Delaron" laminated plastic were on the stand of Thomas De La Rue & Co., Ltd. The importance of textiles for covering fine wires was emphasized in the exhibit of Fine Wires, Ltd., and a moulding material which will absorb



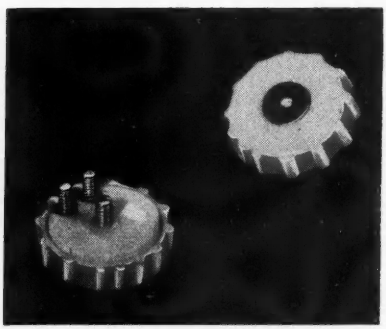
Painton edgewise miniature fader

Dubilier television interference choke and capacitor



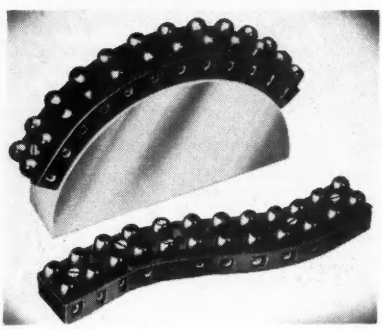
X-rays was shown by the Mycalex Co., Ltd. A cable sorting machine which automatically indicates individual wires in a multi-way cable was demonstrated by Hellerman Electric, Ltd., and a new form of micanite to which the description " High Heat " has been given was shown by the Micanite & Insulators Co., Ltd. This is built-up mica which, by virtue of an inorganic bond, is self-supporting at temperatures up to 500 deg C. Other exhibitors in this section included Bullers, Ltd., H. Clarke & Co. (Manchester), Ltd., Duratube & Wire, Ltd., the London Electric Wire Co. & Smiths, Ltd., the Reliance Electrical Wire Co., Ltd., Steatite & Porcelain Products, Ltd., Suflex, Ltd., and the Vactite Wire Co., Ltd.

As was to be expected, capacitors of all shapes and sizes were on view. Among the exhibits of the Dubilier Condenser Co., Ltd., were special " Nitrogol " paper



Egen miniature hearing aid potentiometer

Belling & Lee flexible terminal block



dielectric tubular capacitors for e.h.t. flyback or r.f. oscillator circuits, which are assembled in a glazed ceramic tube with metal end-cap terminals. This firm also had television interference suppression chokes and capacitors. Midget tubular capacitors measuring only $\frac{1}{8}$in by $\frac{1}{4}$in were shown by A. H. Hunt (Capacitors), Ltd., under the name " Moldseal," and a new range of silvered mica capacitors with a moulded finish known as " Catacon " (category A condenser) was introduced by the London Electrical Manufacturing Co., Ltd. The Telegraph Condenser Co., Ltd., had a range of new high temperature electrolytic types to work at 85 deg C without voltage derating. Other capacitors were shown by Daly (Condensers), Ltd., the Static Condenser Co., Ltd., the Telephone Manufacturing Co., Ltd., and the Wego Condenser Co., Ltd.

During the past year the British Electric Resistance Co., Ltd., has developed a protective coating for wire-wound resistors which will withstand temperatures up to 400 deg C but does not require the high firing temperatures of vitreous enamel. This firm also showed a new range of " Bercostat " power rheostats with ratings up to 100 W. Morganite Resistors, Ltd., had its latest range of Government " type approved " potentiometers and fired resistors while products in a similar category were exhibited by Welwyn Electrical Laboratories, Ltd.

Erie Resistor, Ltd., was also well to the fore in this section together with Painton & Co., Ltd., who had a miniature edgewise fader designed for visual applications where the video signal actually passes through the fader. Egen Electric, Ltd., showed a 3 megohm logarithmic law potentiometer which is believed to be the smallest in the world and is intended for incorporation in hearing aids.

A new range of rotary switches with ceramic insulation was displayed by A.B. Metal Products, Ltd., together with the " Minibank " switch which is claimed to be the smallest multi-pole switch in the world. Wafer switches were also shown by N.S.F., Ltd. A. F. Bulgin & Co., Ltd., have added to their thousands of products a new range of micro-switches which includes miniature types and models for high operational pressure. Their ordinary switches have been improved in respect of extra resistance and peak handling capacity.

Apart from a 12-way 5 A p.v.c. flexible terminal block Belling & Lee, Ltd., had a miniature thermal delay switch for the protection of television and other electronic circuits, and new types of plugs and sockets, including a shrouded 3-pin mains input type and a double screened co-axial connector. " Diamond H " Switches, Ltd., also had several new switches including a range of 3 A single hole fixing toggle types.

Several firms displayed instruments for laboratory, workshop and industrial use. Dawe Instruments introduced a new ultrasonic thickness gauge and a dynamic balancing machine and Marconi Instruments, Ltd., exhibited a direct reading Q meter for use in the frequency range 15–170 Mc/s. Five different signal generators covering a wide range of applications were shown by Advance Components, Ltd., and the Automatic Coil Winder & Electrical Equipment Co., Ltd., displayed a number of electronic instruments, including a fully tropicalized 96-range valve voltmeter. Other firms in the instrument section included Salford Electrical Instruments, Ltd., Taylor Electrical Instruments, Ltd., and Walter Instruments, Ltd.

Sintered permanent magnets for use in instruments were shown by Murex, Ltd., and magnetic materials for a multiplicity of other purposes were displayed by such firms as Mullard, Ltd., the Telegraph Construction & Maintenance Co., Ltd., and Magnetic & Electrical Alloys, Ltd.

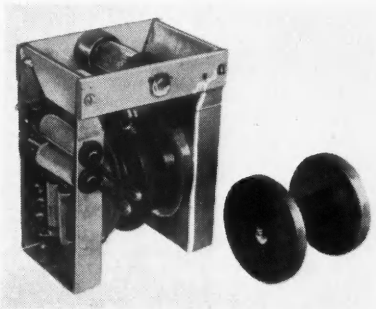
Among the valves and other electronic devices shown by the General Electric Co., Ltd., was a new 16in flat aluminized circular cathode ray tube which has a 70 deg scanning angle and operates at 12 kV. Other valves and cathode ray tubes were shown by Mullard, Ltd., Standard Telephones & Cables, Ltd., and Ferranti, Ltd., the last-named having on view their well-established range of 12in flat faced cathode ray tubes as used in many high quality receivers. Metal cathode ray tubes were shown by the English Electric Co., Ltd., together with transmitting valves, television receivers and an Image Orthicon camera tube.

Television Components

A comprehensive range of television components was exhibited by the Plessey Co., Ltd., together with a range of shrouded loudspeakers specifically designed for use in television receivers. Other speakers with totally enclosed permanent magnets were to be seen on the stand of Acoustic Products, Ltd. Goodmans Industries, Ltd., introduced a new public address pressure type loudspeaker unit and loudspeakers were also to be seen on the stands of such firms as Rola-Celestion, Ltd., Tannoy Products, Ltd., Truvox, Ltd., and Vitavox, Ltd.

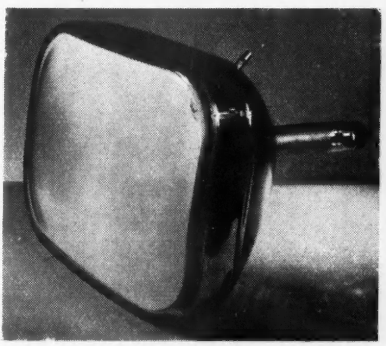
Transformers are found in almost every piece of electronic apparatus and a comprehensive range of these components was displayed by Parmeco, Ltd., Partridge Transformers, Ltd., and the Woden Transformer Co., Ltd.

A representative range of " Cinch " radio, electronic and television components was exhibited by the Carr Fastener Co., Ltd., while the applications of metal rectifiers and copper oxide, selenium and germanium types were included in the display of the Westinghouse Brake & Signal Co., Ltd.



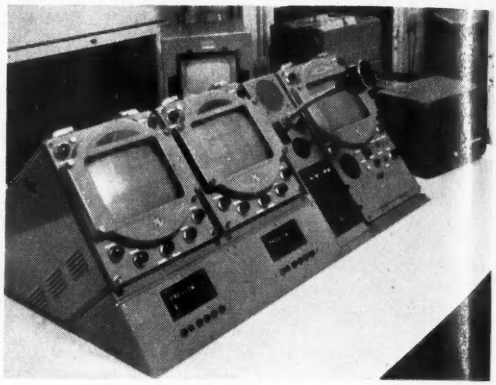
Plessey wide-angle 14 kV line transformer and " Caslam " core

Ferranti 12in flat faced cathode ray tube



Television Studio Equipment

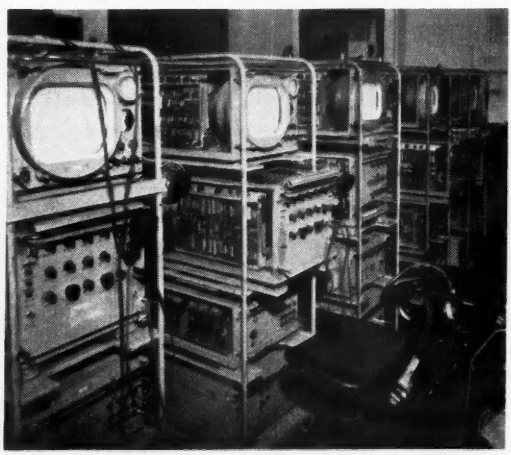
Improved Facilities at Lime Grove



LAST week we had the pleasure of inspecting the B.B.C.'s television studios at Lime Grove, London. These former film studios were acquired early in 1950 and work was immediately begun on converting them for television production. Altogether there are five studios which have been designated D, E, F, G and H and three of these are now in regular use.

In June, 1950, studio D was opened for children's programmes but it is now primarily used for drama productions which were moved from Alexandra Palace last month. It has an area of 5,400 sq ft, more than twice the working space available at Alexandra Palace, and thus makes possible the staging of more ambitious productions. It is equipped with three E.M.I. cameras fitted with C.P.S. Emitron pick-up tubes. The camera mountings used are two Vinten "Pathfinder" crane dollies and one De Brie rolling tripod. It is ultimately intended to replace the crane dollies by power-operated dollies. In addition, a telecine channel is provided which enables film sequences to be inserted in the studio productions as necessary.

Above: **Senior engineer's position in studio H vision control room.**
Below: **Apparatus room showing three C.P.S. Emitron camera control units, vision mixer and telecine control unit**



The sound equipment of the studio is also of E.M.I. manufacture and comprises six microphones, four gramophone outputs for musical and effects inserts and a telecine sound channel for handling the sound traces from any film sequences used in the programmes. Two microphone booms on the studio floor complete the sound equipment.

Altogether 120 kW of lighting is available, but owing to the high sensitivity of the cameras only 75 kW is needed for most productions. Experience has shown that an incident light value of between 100 and 130 ft-candles is adequate for the average set, and under these conditions the approximate peak white brightness reflected from the scene is 70 to 80 ft-lamberts.

Studio G, which has a floor area of 6,000 sq ft was brought into service in December, 1950, and it is used mainly for light entertainment productions and ballet. It is equipped with Pye vision apparatus comprising four cameras, using Photicon pick-up tubes, together with a spare camera channel. Two cameras are on De Brie rolling tripods, one on a Vinten "Pathfinder" crane dolly and the fourth on a Vinten crane power-operated dolly. There is also a telecine channel which enables film sequences to be incorporated in the programmes.

The sound apparatus is B.B.C. type "A" equipment which caters for six microphones, four gramophone outputs and one film sound channel for use with the telecine gear. Special features of this equipment are the immediate availability of spare amplifiers in any channel and a variable degree of echo on the microphone outputs.

Separate sound and vision control rooms are provided, separated by a power-operated window. This enables the sound and vision groups of the production team to work as a single unit with the window open, or separately, with the window closed—thus allowing the sound group to work their equipment at such levels as may be necessary without distracting their vision colleagues.

About 250 kW of lighting is available; the incident lighting on normal settings is generally 130 to 200 ft-candles and the average peak-white brightness reflected from the scenes between 100 and 170 ft-lamberts.

A feature of interest in studio G is the air-conditioning plant, which has been supplied and erected by the Carrier Engineering Co., Ltd., which also supplied the ventilation plant for studio H. Fresh air is drawn in over the coils of a pre-heater which can, if required, be by-passed by opening the fresh-air damper. After being cleaned, the air is passed through cooling coils supplied with chilled water from a refrigeration plant, and then through the main heater battery fed with steam at 50 lb/sq in. Two 15,000 cu ft/min delivery fans pass the air to a low level cork insulated ring duct in the studio. It is extracted by two similar fans through high and low level extract ducts. Provision is also made for recirculation. The air flow is controlled by twenty-three groups of louvres, each of which is fitted with an air-operated damper. The centralized control panel from which these dampers are worked enables the air to be delivered generally and equally over the whole floor area, or all or part of it to be concentrated over any portion of the studio.

The chilled water for the cooler is supplied from a steam-driven absorption refrigeration system, the first of its kind to be used for an air-conditioning plant. The refrigeration plant, which has a capacity of 150 tons/hr, uses 20 lb of steam per ton per hour, and once started is completely automatic in operation, control being effected by thermostats operating motorized valves in the chilled water and steam supply lines.

Two months ago studio H was brought into service for children's programmes. It has a floor area of 2,800 sq ft and is equipped with E.M.I. vision apparatus which was used for outside broadcasts until four months ago. There are three cameras

Studio H sound] control room incorporates B.B.C. type "A" equipment with two picture monitors mounted above it

similar to those used in studio D; two are mounted on Vinten "Pathfinder" dollies and the third on a De Brie rolling tripod. A telecine channel is also provided. The sound installation is similar to that in studio G. The total lighting load is 100 kW, and the illumination requirements are similar to those for studio D.

The layout of the vision control rooms for studio H differs from usual B.B.C. practice in that the vision mixing control desks and picture monitors have been so disposed as to give the production teams a frontal view through the window into the studio instead of the usual side view. A desk in front of the window accommodates the producer, his secretary and the vision mixer, while a second desk on a raised dais to the rear accommodates monitoring equipment for the senior engineer. Both desks incorporate built-in picture monitors and above each position are small spotlights focused on scripts and other documents and leaving all other sections relatively dark.

Vision Mixing Equipment

The vision mixing arrangements were planned to simplify the operations while still giving all the facilities required. This involved modifications of the original E.M.I. equipment by B.B.C. engineers. The vision mixing equipment which forms part of the control gear associated with the cameras is in a room at studio floor level but is remotely controlled from a panel in the vision control room above. The output of each camera is so controlled that "cuts" from one camera to another can be made simply by pressing a button. When it is desired to fade from one camera to another instead of cutting a fader is also provided for each camera. A further facility enables the outputs of two cameras to be superimposed and the degree of superimposition can be pre-set independently of the remaining camera, which may be supplying the transmitted picture.

A new ventilation plant has been installed for studio H and includes air washing, heating and dehumidifying sections. No provision has been made for refrigerating the air but experience shows that the washing process reduces the temperature by 7 or 8 per cent.

Now that three studios are in use at Lime Grove means have had to be provided for switching the output of the studio in use to the television cable leading to Alexandra Palace and the other television transmitters. This has been installed in the lines termination room where the studio outputs, both sound and vision, appear on a bank of relays. These can be operated by keys in the lines termination room but further keys enable control of the relays to be transferred to the studio vision control room so that any studio can switch its own output to line. Interlock circuits prevent more than one studio being connected to line at a time.

The 115 V d.c. supply for studio lighting is provided by four 125 kW and two 250 kW generators driven by 415 V three-phase motors. The main supply is from the B.E.A.'s 6,600 V network over duplicate feeders to step-down transformers rated at 1,500 kVA.

Development of the premises is still proceeding. By the end of the year it is hoped to provide three 35 mm tele-film recording channels. Later, studio F, equipped with four Marconi Image Orthicon camera channels, will be brought into service, adding a further 4,800 sq ft to the production area. This will be followed by the provision of a central telecine suite comprising seven 35 mm and five 16 mm channels.

There is to be a new central presentation suite which will include a continuity studio equipped with two Pye Photicon cameras for announcements, and its own control room. A new central control room will replace the one at Alexandra Palace. There will also be a separate control room for rehearsals, which can thus take place while transmissions are in progress. The suite will also contain a technical quality-checking room and announcers' dressing rooms. Finally a new central apparatus room is to be provided to replace the one at present situated at Alexandra Palace. Studio F, with a floor area of 9,600 sq ft, will not be developed for some time yet but in the interim it will be used for scenery storage.

Electric Wrist Watch

THE New York correspondent of *The Times* reports that the Elgin National Watch Co., assisted by the Armour Research Institute, has produced an electric wrist watch no bigger than the spring-operated type. It is driven by a tiny motor fed from a battery half an inch long and smaller in diameter than a pencil. The makers say that it will operate the watch for more than a year. Only a laboratory model has been produced so far.

Shipbuilding in 1951

Lloyd's Annual Report

THE demand for new tonnage shows no sign of abatement, notwithstanding an increase of 2·6 million tons gross in the size of the world merchant fleet within the space of 12 months. It is shown by Lloyd's Register of Shipping that the world fleet, including the United States reserve fleet, is now 87·2 million tons gross or 27 per cent in excess of the pre-war total. The increasing world consumption and stocking of oil is reflected in the remarkable growth of tanker tonnage, which represents more than one-fifth of the total and is fully 50 per cent greater than it was in 1939.

In every shipping country there is evidence of continuing activity. A notable feature of the past year was the revival of the shipping industry in seven countries in Europe and Japan where, thanks to American assistance, the tonnage output is now comparable with, and in most cases exceeds, that of 1939.

Last year 105 oil tankers of 1,061,429 tons were completed under the Society's survey while the total number of ships completed to the Society's classification was 472, of an aggregate gross tonnage of 2,151,882, which represented 60·5 per cent of the total built throughout the world during the year. The total number of merchant ships bearing the classification of Lloyd's Register (united with the British Corporation) was 9,729 of 36·26 million gross tons, or 41·2 per cent of the total tonnage of merchant shipping afloat at that time.

Application of Welding

The Society has continued its close study of problems which arise from the expanding use of welding, particularly in connection with the quality of mild steel of the greater thickness now frequently being required for the construction of large tankers. Approval has been granted to a number of steel makers at home and abroad for the manufacture of such steel to satisfy the Society's more stringent requirements for welded alloys. Since the previous report 154 new electrodes have received approval, including 125 approved for welding in all positions and one additional automatic electric welding process, so bringing the total number on the list of approved electrodes to 550 manufactured by 141 different companies in 24 countries.

Radiographic control of shipyard welding continues to expand and further applications for approval of laboratories have been received or are in contemplation. The training of surveyors in the United Kingdom in the application of radiography is being carried out at the Society's approved course at the Kodak X-Ray School.

Boiler Construction

The extent of welding in the construction of boilers and other pressure vessels for ships classed with the Society as well as for land purposes is indicated by the number of firms which have been recognized during the past year for the manufacture of Class I fusion welded pressure vessels. It is worthy of note that recognition has been accorded to an increasing number of firms abroad.

Following the satisfactory results of a series of preliminary tests carried out at a works in Great Britain under the supervision of the Society's surveyors approval has been given to the use of electric resistance welded tubes for smoke and water tubes and for steam and other pressure pipes.

The practice of building dry cargo carriers with longitudinal framing at bottom and deck in conjunction with transverse side frames has increased. This arrangement has many advantages for welded construction. In tankers, on the other hand, this "combined" system is now giving way to the completely longitudinal framed design. Corrugated bulkheads are being increasingly favoured and also scalloped welded framing and stiffening. Considerable attention has been given to the deflection of ships under different conditions of loading and work continues on experiments for determining the reason for the corrugation of the bottom of welded

ships. The results obtained justify the additional stiffening required by the Society in ships exhibiting this defect.

The serious fractures sustained by a small number of the very many welded ships built during the late war, mostly in the United States, has focused attention on the problems encountered in welded construction. From the time when reports of these mishaps were first received all aspects of the subject have been closely studied and much research has been undertaken with which the Society's staff has been intimately associated. With the knowledge thus progressively gained additional safeguards have been required with respect to the steel used in new welded construction and changes in design have also been introduced, while the hull structures of various types of existing welded ships have been modified. The Society's records of structural damage in tankers also clearly indicate the importance of longitudinal distribution of cargo and water ballast. A memorandum on judicious loading to minimize longitudinal stresses, issued by the Society in July, 1951, has been welcomed by tanker owners and also by shipbuilders.

The Society's staff has been closely associated with the analysis of the results of sea-going and static structural trials carried out under the auspices of the Admiralty Ship Welding Committee. Tests on structural components, both riveted and welded, being carried out by the British Shipbuilding Research Association with investigators provided from the Society's technical staff, continued to furnish valuable data for application to improved and economical design. There has been an increasing tendency to build ships with machinery fitted aft. The world tonnage of ships with steam propulsion has remained practically constant since the war while the tonnage of motor ships has increased steadily. The tendency to increased speeds has been maintained in the case of both cargo ships and oil tankers. Increases of power have also been noted.

The first full scale trial of a marine gas turbine propulsion set (*Electrical Review*, 23rd February, 1951) was an outstanding event of the year under review. The ship concerned is the Anglo-Saxon tanker *Auris* and the Society says that the company is to be congratulated on this notable experiment. Results of the trial were very successful, but the Society indicates that it is well to realize that much remains to be learned about the design, construction and operation of gas turbines before this type of propelling machinery becomes a serious competitor with other types of prime mover.

The tentative rules for quality and testing of aluminium alloys for ship construction issued in 1947 have been widely accepted as a guide to the development of suitable materials. Twenty establishments in six countries have been entered on the Society's approved list. Progress in welding methods for these alloys is being closely watched.

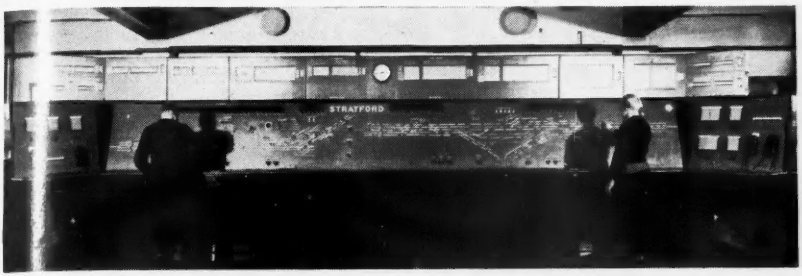
The Society's non-marine work has included inspection for the Hydro-Electric Commission of Tasmania, in connection with two new hydro-electric power stations, of four turbo-alternators of 31,250 kVA and four units of 25,000 kVA. They will be in addition to existing hydraulic turbines and alternators which were constructed under the Society's survey. The Society is also inspecting and testing during manufacture transmission line towers, overhead line insulators, some 30 power transformers varying in size from 5 to 100 MW and a large number of smaller units. The structural steelwork for power station buildings, cranes, etc., is also being constructed under the Society's supervision.

Street Lighting Improvements

EDMONTON Works and Highways Committee reports that revised estimates, amounting to £28,464 for the conversion of 1,911 lamps from gas to electricity have been discussed with representatives of the Ministry of Transport, who have stressed the limitations imposed on capital expenditure. They intimated that the Minister might favourably consider a portion of the scheme as a further stage in the conversion proposals, especially if this stage were limited to roads in the district which carry through traffic, and improvement in the existing lighting were proposed. A separate estimate for dealing with 23 roads and involving the conversion of 357 lamps at an estimated cost of £5,680 has therefore been forwarded to the Ministry.

DURHAM City Council is considering estimates for a relighting scheme in Saddler Street, Elvet, Church Street and Hallgarth Street. The Ministry of Transport has agreed to recommend loan consent for the work.

DONCASTER Corporation Estates and Housing Committee has approved plans for street lighting on the Cantley estate (Stage 2) and application is to be made for sanction to borrow £5,600.



Train Describer System

New Installation for Liverpool Street–Shenfield Lines

THE new train describer system which is part of the re-signalling scheme for the Liverpool Street–Shenfield electrified railway has now been completed and brought into service. This system is the largest of its kind and operates over a four-track continuously track circuited section of line between Liverpool Street and Romford with a four-track branch from Bethnal Green to Hackney Downs, a double-track branch from Bow Junction to Gas Factory Junction and two additional tracks from Liverpool Street to Bethnal Green. The main line signal boxes concerned are Liverpool Street, Bethnal Green, Mile End, Bow Junction, Stratford, Forest Gate Junction, Ilford, Ilford Carriage Sidings, Goodmayes, Chadwell Heath and Romford.

The system is fully automatic: a description initiated at Liverpool Street or Romford is automatically transferred from signal box to signal box in step with the progress of the train.

Each signal box has a transmitter and a "Last Sent" indicator for each track leading away from the box and a receiver indicator for each track approaching the box. The receivers generally comprise a number of indicating lamps arranged in a horizontal row. These lamps are repeated in as many horizontal rows as may be necessary. The bottom row is labelled "Third in Section" and the rows above—in ascending order—"Second in Section," "First in Section," "At Signal 'X'," "At Signal 'Y'," "At Signal 'Z'" and "Last Sent." Thus each vertical row represents a train which appears as third, second or first in section (depending on how many trains are between the signal box in question and the box in rear), and then appears successively as being at each of the various signals controlled by the signalman until it finally reaches the position of "Last Sent" which indicates that it has passed into the section ahead.

The vertical rows of lamps are divided into two groups, the left hand group consisting of seven vertical columns headed "S.E.P.G.C.L. & M." Illumination of one, two or three of these lamps indicates the class of train. The right hand group indicates the destination of the train; thus a full description of a train is given by the illumination of one or more of the various seven lamps, plus a destination lamp: SEP-SO, for instance, indicates a special express passenger train for Southend. The illuminated description of the train moves upwards as the train passes from signal to signal.

The set-up units comprise panels with push-keys for setting up the train description and destination. There are twelve description keys in each signal box, but the number of destination keys varies according to the positions. "Interpose" and "Clear" keys are also provided for

Our title picture illustrates the train describer installation in Stratford signal box

introducing or clearing descriptions at certain selected signals. Co-operative cancelling keys are fitted so that the last train transmitted to the box ahead may be cancelled.

Emergency Operation

In the event of failure of any part of the equipment, the signalman can operate an emergency switch (one per line) which cuts off the controlling features and, in effect, converts the apparatus to a manually operated system. Under these conditions, train descriptions are transmitted from signal box to signal box by interposing directly into the "Last Sent" register which, after accepting the description, transmits it at once to the box ahead. The description in the "Last Sent" register flashes until a check is received from the forward instrument indicating that the description has been correctly received. Trains are cleared from the "In Section" part of the instrument by operating a key labelled "Clear 1st in Section."

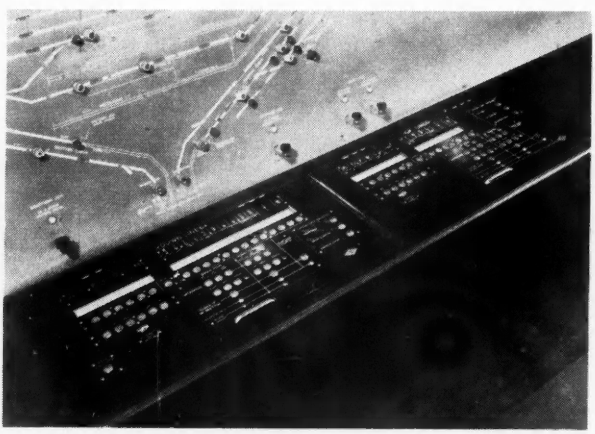
In the case of the six signal boxes with signalling control panels, the set-up equipment is mounted on the desk in front of the panel. Where lever frames exist, the set-up equipment and display panels are mounted in cabinets which stand so as to form wings to the lever frame. The coding apparatus for operating the system is housed in metal cubicles in the signal box relay rooms.

When a train leaves Liverpool Street, Gas Factory Junction, Hackney Downs or Romford to proceed into the area covered by the system, the signalman sets up the appropriate description and interposes it into the signal position next ahead of the train. Operation of the overlap track circuit of this signal passes the description forward and from that time until the train leaves the describer area no further manual operation of the apparatus is required.

Because of the relative shortness of the sections on this line, it was considered that if transmissions of a description to the box ahead were delayed until the train had reached the overlap circuit of the last controlled signal, the signalman ahead might not have sufficient warning of the approach of the train.

To meet this possibility an "early re-transmission" feature has been introduced which permits forward transmission of a description when the train is passing through the intermediate signal registers, provided that all signals ahead of the train are in the clear position. In extreme cases the description is re-transmitted a few seconds after it has been received from the rear signal box. When early re-transmission has been effected an indicating light appears alongside the description on the display panel. This "transmitted" indication then steps forward with the description, being finally extinguished when the train passes the last controlled signal and the description is transferred to the "Last Sent" register.

Typical set-up unit inset into control desk



In the case of "up" line trains for Liverpool Street, the destination indication "LV" ceases at Bethnal Green and only the description of the train is automatically transmitted forward to Liverpool Street. When re-transmission of this description commences a buzzer is sounded on the timekeeper's desk in Bethnal Green signal box. This man's desk is provided with a panel enabling him to set up the platform

number at Liverpool Street into which the train is to be directed. The platform number are manually transmitted by the Bethnal Green timekeeper and appear on the destination section of the Liverpool Street display panel alongside the already received description.

If the overlap track circuit of the last controlled signal becomes occupied when there is no description in the register relevant to this signal, a not described (" ND ") indication appears on the display panel and an alarm bell sounds continuously. Both the bell and the " ND " lamps are restored to normal by operating the " Bell Cut-off " key. The signalman must then transmit the description of the train by interposing it into the " Last Sent " register.

Typical layout of apparatus in conjunction with a mechanical frame and diagram

A simple form of train describer is provided for the two " carriage lines " between Bow Junction and Stratford. These lines are signalled for use in both directions and are each equipped with a transmitter and receiver at both terminal signal boxes. The train description and destination are combined in one indication and the apparatus is non-automatic. Twelve line wires are used between Bow Junction and Stratford for the four circuits, the codes being transmitted on the " pattern " system.

Uniselectors and Relays

All uniselectors and relays are operated from a 50 V d.c. source. The indication lamps are lit directly from the 110 V a.c. supply through 110/12 V transformers. Standard Post Office telephone type apparatus is used throughout, the uniselectors being of the latest single coil type. A novel feature is the employment of a " both-way " uniselector fitted with both forward and backward drive magnets.

The transmitted codes consist of 25 impulses, divided into two groups by a short pause. Positive impulses are used for the descriptions and negative for the destinations. The positive and negative impulses are sent alternately at the rate of 11/sec. The total time for transmission and checking back of a full description is about 4 sec.

One pair of line wires is provided for each section of each running line, i.e., generally speaking, four pairs of wires are required throughout. The codes are sent from box to box using the " constant total " impulsing system which eliminates much of the delay experienced in older types of apparatus where elaborate " check back " circuits were employed. The display lamps are all in duplicate, one lamp of each pair in the " description " indications being under-run.

Power is supplied by 50 V lead-acid batteries the capacity of which varies according to the size of the installation at any particular place, the battery chargers being fed from the 110 V a.c. signalling power supply system.

The equipment was designed, manufactured and installed by the Siemens & General Electric Railway Signal Co., Ltd., to the requirements of Mr. A. Moss, Signal and Telecommunications Engineer, Eastern Region.

Electrical Contacts

I.E.E. East Midland Centre Convention

ON Monday last the East Midland Centre of the Institution of Electrical Engineers commenced a three-day convention on electrical contacts at Loughborough College. The convention was opened by Dr. W. G. Radley and was under the chairmanship of Mr. A. W. Hirst. The first paper was presented by Dr. L. B. Hunt (Johnson, Matthey & Co., Ltd.), who reviewed contact selection and design and dealt with such factors as the chemical and physical properties of the materials to be employed and the electrical and mechanical conditions of operation.

The behaviour of metallic contacts at low voltages in adverse environments was considered by Dr. A. A. Fairweather (Post Office Research Station). The principles outlined provided the necessary theoretical basis for design and testing techniques and the results represented an interim stage in part of a wider investigation which is to be made at the Post Office Research Station. The next paper, by Dr. A. L. Allen (Ericsson Telephones), dealt with long-life contacts for unidirectional currents of 1–20 A.

Miss H. Warham (E.R.A.) then dealt with the effect of inductance on fine transfer between contacts. She showed that there was a residual transfer independent of inductance but that transfer was dependent on inductance when it was greater than 0·3 μH.

The theory of the influence of the Thomson effect in molten metal bridges was given and the effects of electrodynamic forces discussed by Dr. P. M. Davidson (University of Wales). The importance of the molten metal bridge in the process of fine transfer was then discussed by Mr. R. Hill Jones (University of Wales) who also critically reviewed the work of previous investigators on the properties of microscopic molten bridges.

Contact erosion due to electric discharges was considered by Prof. Llewellyn Jones (University of Wales) after which Dr. J. C. Chaston (Johnson, Matthey & Co., Ltd.) dealt with some of the effects of surface films on contact behaviour. After Mr. D. O. Walter (Johnson, Matthey & Co., Ltd.) had spoken on design of light-duty sliding contacts Messrs. C. W. A. Mitchell and T. F. A. Urben (both of the Post Office Engineering Department) described practical applications of contacts in telephone exchange systems.

The second and final part of the convention was concerned with heavy-duty contacts including contactors and sliding contacts (brushes). First, Mr. H. W. Baxter (E.R.A.) gave a general review of the factors influencing contact wear and an indication of the kind of information still required to provide a sound basis of design. Contactor contacts were then treated in some detail by Dr. W. Wilson (G.E.C.) after which Dr. R. W. Sillara (Metropolitan-Vickers) spoke on arc suppression at contacts interrupting medium currents.

Some methods of improving brush contact efficiency and their influence on machine performance were subsequently treated by Messrs. T. H. Cook and M. Vaughan (both of the Morgan Crucible Co., Ltd.) and Dr. P. F. Soper (Northampton Polytechnic, London) discussed the possible properties that determined the shape of the volt-ampere characteristic of sliding contacts. In conclusion, Mr. R. F. Sims (Royal Aircraft Establishment) dealt with the nature of the carbon-copper rubbing contact and its dependence on atmospheric conditions.

Sheffield Transport

AT a meeting of Sheffield City Council on 2nd April it was stated that a letter had been received from the Minister of Transport about the proposed replacement of the city's trams by motor buses. The Minister was not opposed to the scheme, but considered that it might be deferred or modified so that the capital investment might be comparable with that for the working of the transport system during the same period. The Transport Committee is considering the proposed modification. The change-over scheme was planned to take place over a period of fifteen years.

Commerce and Industry

Exhibition Electricians' Pay

Synchronous Clock Trading

By Award No. 130 the Industrial Disputes Tribunal has stipulated that electricians employed on exhibition installation work at Earls Court, Olympia and the White City shall be paid an extra 2d per hour. In opposing the claim of the Electrical Trades Union on behalf of its members, the National Federated Electrical Association contended that extra payment should be contingent upon the Union's proving that exhibition work was more highly skilled, demanded higher qualifications, was undertaken in less favourable conditions or possessed characteristics which justified additional payment above that for any other class of work in the industry. It denied that any of these circumstances governed exhibition work.

The Union claimed that the fact that the N.F.E.A. had agreed to an extra 2d per hour from 28th August, 1950, to 31st December, 1951, for electricians employed at the three exhibition centres and at the Festival sites at South Bank and Battersea showed that the employers had accepted the Union's arguments.

Contract Conditions

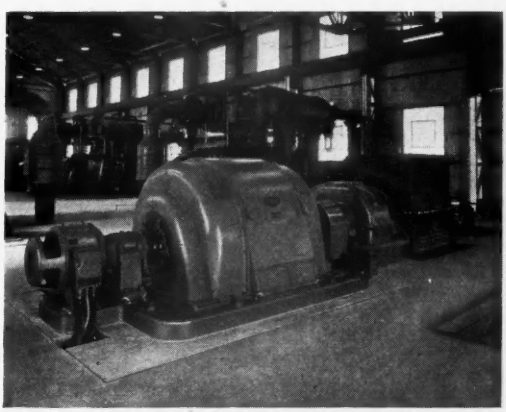
A shorter Model Form of General Conditions of Contract, known as "Form A1.SF—Home Contracts, with Erection (Short Form)," has been prepared by the Joint Committee on Model Forms of General Conditions of Contract of the Institutions of Mechanical and Electrical Engineers, and published under the authority of the Councils of the two Institutions. This is a shorter, modified version of "Model Form of General Conditions of Contract A—Home Contracts, with Erection," and is designed for contracts for which a minimum of site engineering work is involved and for which the purchaser does not employ an independent engineer to exercise the powers given to him by Model Form A. Thus, provisions relating primarily to contracts involving considerable engineering work on site, and references to an engineer have been omitted from the shorter form. It is hoped that for many smaller contracts the new form will take the place of separate conditions now being used by individual contractors and purchasers. Copies of the form are obtainable (price 4s, including postage) either from the Secretary, Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, or from the Secretary of the I.E.E., Savoy Place, London, W.C.2. Copies of Model Form A continue to be available, price 5s, from the Secretary of either Institution.

Productivity Council

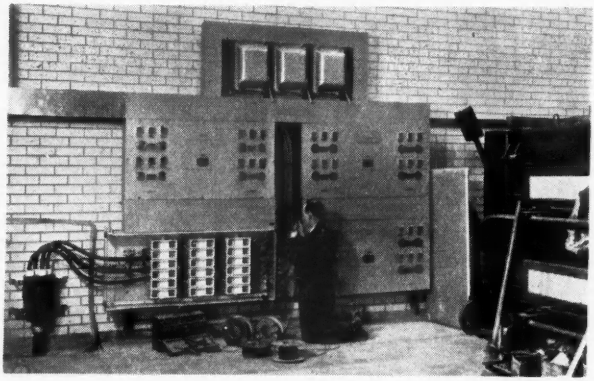
A B.B.C. announcement last week referred to the discontinuation of the productivity teams which have been visiting America under the auspices of the Anglo-American Council on Productivity. The position appears to be that the present team programme will be discontinued in May, and a meeting of the American and United Kingdom Sections of the Council will be held about the middle of the year to decide the future of the Council.

Compressors for South African Mines

Since 1939 the General Electric Co., Ltd., has received orders for twenty-seven motor-driven turbo-type compressors for gold mines in South Africa. Fifteen of these compressors are in service and seven in course of installation. One of the two compressors for the St. Helena Mines



One of the motor-driven turbo-type compressors supplied by the G.E.C. for the gold mines of the Union Corporation, Ltd.



The cabling for the all-electric bakery of Turner & Son, Ltd., Nottingham

of the Union Corporation, Ltd., has recently been commissioned and is illustrated. The compressor has a capacity of 20,000 cu ft of air per minute at a pressure of 100 lb per sq in absolute, when running at 5,120 r.p.m. It is driven through speed-increasing gears by a 4,485 h.p. 4-pole synchronous motor which operates at a power factor of 0·9 leading, on a 6·6 kV, 50 cycle supply. In the background of the accompanying picture are four reciprocating compressors which were installed several years ago. Each is driven by a 925 h.p. G.E.C. slipring motor.

F.B.I. Report

The annual general meeting of the Federation of British Industries was held at the Federation's headquarters on Wednesday last. A wide field is covered in the annual report presented at the meeting, particularly in the section containing the Federation's views and recommendations on national policy. Reference is made to the evidence being submitted to the Ridley Committee on the best use of the nation's fuel and power resources and to steps taken by the Federation in connection with the supply of coal and electricity to industry.

Sir Archibald Forbes was re-elected president of the Federation for the ensuing year and the vice-presidents include Mr. Harry Allcock, Sir Ernest Canning, Col. R. K. Morcom and Sir Alexander Roger.

All-Electric Bakery

The large new all-electric bakery of Turner & Son, Ltd., Talbot Street, Nottingham, the erection of which coincides with the company's centenary, is capable of producing 1,500 loaves per hour, in addition to cakes and pastries. Total loading of the bakery is 500 kW, of which 350 kW is accounted for by the five capacious ovens. This load has necessitated the installation of a 500 kVA substation by the East Midlands Electricity Board on the premises and the provision of 0·50 sq in 3½ core paper insulated cables to feed the oven control panels and general switchboard. All the main rubber insulated cabling is carried in overhead steel trunking. The electrical contractors for this installation were Attenborough & Turpin, Ltd., of Nottingham. All the cable, totalling 20,000 yards, and all fluorescent lighting fittings in the bakery were supplied by the Edison Swan Electric Co., Ltd.

Edmundsons Acquire Sloan Co.

The electrical wholesale business of the Sloan Electrical Co., Ltd., has been acquired by Edmundsons Electric Co., Ltd. As a member of the Edmundsons group of companies, the Sloan Electrical Co. will continue to trade as an independent unit from its branches at Vauxhall, Ealing, Leyton, Peckham, Bristol, Edinburgh, Exeter, Manchester and Truro. Mr. N. Robertson will continue as chairman of Sloan Electrical Co., Ltd., and Messrs. J. MacNish, F. D. Pratt and A. H. Young, who are directors of Edmundsons Electric Co., Ltd., have joined the Sloan board.

Synchronous Clock Conference

Difficult trading conditions, caused by the shortage of materials and the general economic position, are referred to by Mr. H. A. Knox in his report for 1951 as chairman of the British Synchronous Clock Conference. Heavy increases in production costs were borne by the manufacturers; there were no general price increases during the year. It has been necessary, however, to pass on to the public a small part of the cost of the recent labour award.

Although the industry is actively participating in the rearmament programme endeavours are being made to meet the demands of home and overseas purchasers. As regards exports, the industry is still faced with import restrictions and frequency variation in certain countries. Material shortage is still the main problem, but the members are endeavouring to overcome the handicaps and attain the export target (40 per cent—all clocks mechanical and electrical).

All applications for inclusion in the Register of Approved Wholesalers have been carefully considered and the Conference has continued

to work amicably with the wholesalers as well as with the contractors and retailers. Active participation in the work of the Electrical Fair Trading Council was continued.

Aluminium Scrap Prices Increased

The Minister of Supply has made the Aluminium Scrap Prices Order, 1952 (S.I. 1952 No. 686), increasing the price of aluminium scrap from 1st April. The Order provides a maximum price for new pure plain aluminium foil stock scrap, and increases the maximum prices for all other aluminium scrap and for aluminium alloy scrap. The maximum prices take account of the increase in the price of virgin aluminium announced by the Minister of Materials on 29th March.

Engineering Wages Claim

At a meeting at York last week of the Executive Council of the Confederation of Shipbuilding and Engineering Unions it was proposed to make early application for a substantial increase in wages for about 2,500,000 workers in the engineering and shipbuilding industries. The matter is to be considered at a meeting of executives of the unions concerned on 18th April.

Annual Holiday

The Telcon Works, Greenwich, and Frequency Works, Farnborough, Kent, of the Telegraph Construction and Maintenance Co., Ltd., will be closed for the annual holiday from Friday, 18th July, until Tuesday, 5th August.

Heavy Duty Cooking Equipment

The Simplex Electric Co., Ltd., has now established at its London showrooms at 217–219, Tottenham Court Road, W.1, a display of "Creda" heavy duty cooking equipment which has been laid out in accordance with modern kitchen practice. The new kitchen showroom has been set up specially for the benefit of the trade so that customers can see a comprehensive display of equipment set out in accordance with "Creda" practice. The display of equipment includes a steaming oven, boiling pan, island suite made up of unit type ranges, boiling table, and a general purpose roaster.

The new London kitchen showroom of the Simplex Electric Co., Ltd.

B.S.I. Women's Advisory Committee

The establishment of a Women's Advisory Committee a year ago gave the British Standards Institution direct access to the views and experiences of "at least one family out of every eight" in the United Kingdom. This broad sample of consumer opinion derives from the 1,500,000 membership of the nineteen national women's organizations which nominated representatives to serve on the Committee; their membership is representative of every part of the country and every class of the community. Thus has the Women's Advisory Committee met the implied recommendation of the Cunliffe Committee on the B.S.I. that "representation of the domestic user is a . . . matter which demands serious attention." The W.A.C. (chairman: Mrs. A. W. Wakefield) provides a forum in which the opinion and feelings of women can be brought together and measured, which may be the best way to secure effective collaboration between makers and users. The most encouraging outcome is a clear tendency for policy and technical committees of B.S.I. to call upon the W.A.C. for opinions and advice when drafting or revising Standard Specifications of consumer interest, which the B.S.I. is being asked to do with growing frequency.

Servicing Domestic Refrigerators

A book intended primarily for the use of domestic refrigerator maintenance mechanics has been published by the British Electrical Development Association. Entitled "Sealed System Type Domestic Refrigerators," it is in a convenient form and shape for the tool-box

or pocket, and forms a guide for the maintenance electrician to enable him to deal with trouble calls from owners of post-war refrigerators, practically all of which have sealed systems. An analysis of defective units has shown that an unnecessarily large number suffer only from minor faults which could be dealt with on site. In order to help the maintenance electrician to trace and put right these simple defects, this book has been published by E.D.A., in collaboration with the British Refrigeration Association. It commences with a basic wiring diagram of the sealed unit refrigerator, followed by a description of the operation of the starting and overload relays, details of general service procedure, and notes on diagnosing faults and remedying them. A separate section of the guide is devoted to similar information on the English Electric refrigerator, which is quite different from the majority of other makes. Copies of the publication are obtainable from the Association at 2, Savoy Hill, London, W.C.2, price 1s 6d each or 1s 3d each for quantities of a dozen or more.

Catalogues and Lists

Chloride Batteries, Ltd., Exide Works, Clifton Junction, near Manchester.—"Mechanical Handling Today"—an illustrated booklet providing examples of the use of battery-powered electric trucks in industry.

James Neill & Co. (Sheffield), Ltd., Napier Street, Sheffield, 11.—Illustrated leaflet on the new "Eclipse" pad handle.

Laurence, Scott & Electromotors, Ltd., Manfield House, Southampton Street, London, W.C.2.—Publication No. 35 on the "Trislot" high-torque, low-current, squirrel cage motor.

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, London, E.C.4.—Catalogue No. 998 dealing with "Sieray" fluorescent fittings and list No. 1008 on "Sieray" fluorescent lamps.

Trade Announcements

A showroom has been opened at the works of **A.B.C.D. Plastics, Ltd.,** 32, York Way, Kings Cross, London, N.1, where a full range of the company's lighting fittings can be seen.

Cryselco, Ltd., announce the removal of their office and stores from 4, Vesey Street, Birmingham, 4, to more commodious premises at 99/100, Charlotte Street, Birmingham, 3 (telephone : Central 7809/0).

Import Licensing

FOLLOWING upon the withdrawal of open general licences for certain imports from Western European and some other foreign countries, the Board of Trade is inviting applications for import licences for the goods listed. Quotas will be established and the values announced later. Except where otherwise indicated, the licences will be valid for the import of goods originating in and consigned from any countries other than the "Scheduled Territories" (to which open licences still apply) or the following countries:—Albania, Argentina, Bolivia, Bulgaria, Canada, Colombia, Costa Rica, Cuba, Czechoslovakia, Dominican Republic, Ecuador, El Salvador, French Somaliland, Germany (Russian Zone), Guatemala, Haiti, Hungary, Japan, Korea, Liberia, Mexico, Nicaragua, Panama, Persia, Philippines, Poland, Rumania, Tangier, the United States of America, the Union of Soviet Socialist Republics, Venezuela and Yugoslavia.

Applications for licences to import the scheduled items during the rest of this year should be sent to the Board of Trade, Import Licensing Branch, Tufton Street, London, S.W.1, by 17th April. Applications must be supported by certificates of imports during 1951 of the kind of goods specified. The schedule of goods subject to the foregoing procedure includes the following:—

110. *Electrical appliances and apparatus, other than lamps and lighting fittings.*—Bells and buzzers; blankets and pads, electrically heated; coffee percolators; cooking apparatus and parts and fittings therefor; drink mixers; fans; floor polishers; gas lighters and elements; hair-dressing appliances; irons; kettles; shavers; toasters; vacuum cleaners and attachments; and parts of the foregoing items.

111. *Lighting appliances, electric.*—Hand lamps, pocket lamps, hand torches and inspection lamps operated by a dry battery, and cases therefor; lamps, filament or discharge (including fluorescent)*; lighting appliances and fittings, not containing pottery or glassware (except for insulating purposes).

112. *Miscellaneous appliances, electric or non-electric.*—Dishwashing machines, domestic, and parts; laundering and dry cleaning machines, being washers and dryers of a capacity not exceeding 3·5 cu ft and wringers and ironing machines with rollers of a length not exceeding 18in, and parts; lawn mowers and parts; and refrigerators of a capacity not exceeding 12 cu ft, and parts.

* Not automobile lamps, which remain on open general licence.

It should be noted that the limit of capacity below which importers of refrigerators (except from the Sterling Area) must obtain individual licences has been raised from 7 cu ft to 12 cu ft. The similar limit of capacity for washing machines, dry-cleaners or dryers has been raised from 3 cu ft to 3·5 cu ft.

Electronically Controlled Refinery Unit

Time Lags Eliminated

THE new sulphur dioxide extraction plant put into operation recently by National Oil Refineries, Ltd., at Llandarcy, South Wales, to produce premium grade kerosene, is believed to be the first refinery plant in the world to be completely controlled electronically. This plant is part of the Anglo-Iranian Oil Co.'s development programme in the United Kingdom, and marks a considerable technical advance in instrumentation and process control.

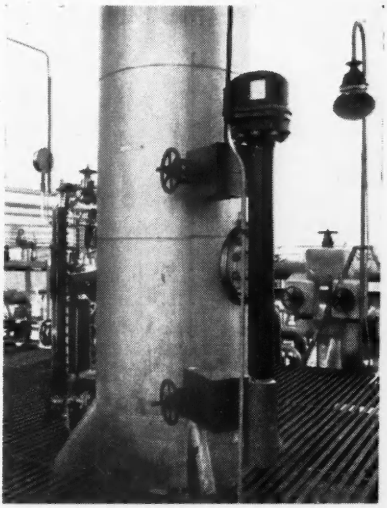
Electronic measuring and control instruments which are used exclusively in the plant for flow, pressure and level, operate on the Evershed electronic repeater system. The advantage of electronic, as opposed to pneumatic, operation lies in the fact that the response is virtually instantaneous irrespective of the distance between the plant and the control room. Time lags due to the compressibility of air in the transmission lines, an inherent factor in any pneumatic control system, are therefore eliminated, and any deviation from the required quantities of flow, pressure or level is detected and corrected instantaneously.

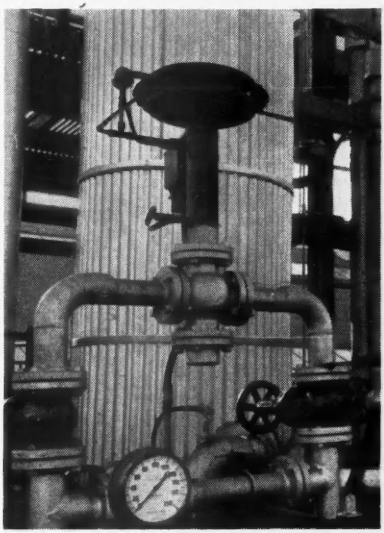
The main development is the Evershed process controller, a three-term instrument having directly calibrated adjustments for proportional band, integral and derivative times. It has an output of a few mA d.c. and is used to position standard diaphragm type control valves, using air pressure as the motive power. Connection between the plant and control room is by multi-core telephone cable.

The equipment is certified as intrinsically safe, and flame-proofing is required only on certain apparatus in the control room which is connected directly to the mains. It is independent of wide variations in supply voltage and frequency.

The Llandarcy plant was designed for an output of 330 tons per day, but is now operating at 500 tons daily. The instrumentation comprises twenty-four Evershed process controllers, seventeen being concerned with liquid levels, four with flow and three with pressure. In addition various other quantities are indicated and recorded, and an alarm system is provided. The main control panel consists of 26 sections each 2ft wide and 6ft high.

The instrumentation is unique in that it is entirely British in conception, design and manufacture in a field previously the prerogative of American industry. It is the outcome of a development programme instituted by Evershed and Vignoles, Ltd., four years ago to extend their remote control apparatus to the process control field. Specially rugged construction in non-corrosive materials has been necessary to meet conditions encountered in the oil industry.





Evershed displacer level transmitter at Llandarcy and (below) electro-pneumatic relay installed on a Hammel-Dahl valve

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Domestic Heating Methods

IN your issue of 28th March you refer to two letters, by Mr. E. W. B. Gill and by myself, published in *The Times* of 20th March. I really must protest against the way in which both are distorted in your note.

You say that Mr. Gill showed that "even if the best modern coal stove had been used, there would still have been a substantial saving" (of coal by the use of electricity for heating college rooms). What Mr. Gill said was that it was doubtful if the best modern stove would reduce the coal consumption to less than that required to generate the electricity now used for heating in his college. He made no claim such as you ascribe to him.

You ascribe to me the suggestion that sufficient solid fuel appliances are not obtainable. I did not suggest anything of the kind. Moreover, you alter my reference to the peak to a reference to cold weather. I hope, therefore, that you will do me the justice of quoting my letter in full. It read as follows:—

> "People who switch on electric fires do so because they feel cold: if too many people switch on together when the factories are working they will remain cold because they cause a peak and the power will be cut. To tell people not to switch on until the peak has gone is like selling umbrellas in Manchester on condition that they are not put up when it rains. When more people have continuous-burning modern solid fuel appliances using smokeless fuels or bituminous coal at minimum efficiencies much higher than the 20 per cent of electric space heating, electricity can be made more freely available where the country urgently needs it—in the factories and workshops. Until then load-spreading, or power cuts and cold housewives, will remain with us."

London, S.W.1. ERIC BELLINGHAM,
Director-General,
Coal Utilization Council.

[The letters in *The Times* were necessarily summarized by us. Mr. Gill said that the electricity used in heating the college rooms represented the consumption of 6 cwt of coal at the power stations. The coal fires previously used required 15 cwt. He went on to say:—"It is true that the fires were open fires, but it is doubtful if the best modern stove would reduce the 15 cwt to less than 6 cwt." In our summary we attributed to Mr. Bellingham the phrase: "until sufficient solid fuel appliances were obtainable"; we should have said "obtained." We think that our paraphrase: "to tell people not to switch on their electric fires in cold weather," was not entirely inaccurate.—Editors, *Electrical Review*.]

Nationalized Inertia

THE article with this title in your issue of 14th March quotes only some of the "effects" of nationalization without getting down to the major causes.

Many employees in the industries affected will agree that the main cause which is leading to frustration and high administrative costs is the over-centralization of authority.

Most of the Area Boards took over some 50 undertakings at Vesting Day and in order to secure the sole authority they proceeded to withdraw the persons who had managed those undertakings successfully and economically for many years. The Boards then found that in order to maintain authority in each of the undertakings they had to build up a colossal administrative machine to propagate their instructions, and this they did by the setting up of the two-tier organizations of Sub-Areas and Districts.

The former, whilst having some administrative authority, is mainly used as a glorified post office for the passing on of instructions and policy and for the visiting of various Districts, thus using excessive amounts of transport. This point is brought out by the fact that the postage and telephone expenditure of the Area Boards increased from £613,778 in 1948–49 to £959,119 in 1950–1 (55 per cent), the administrative transport from £439,000 to £788,000 (80 per cent) and distribution transport from £876,000 to £1,607,000 (84 per cent).

During this period the energy sold and revenue increased by 20 per cent. One would have assumed that any efficient organization would have attempted to

confi[illegible] increases in costs to 20 per cent, offse[illegible]ng higher expenses by some increase in e[illegible]ciency. Not only that, it may be assu[illegible]d that 1948–49, the first year of nati[illegible]alization, was an expensive year owi[illegible] to many non-recurrent items.

A[illegible] examination of the accounts reveals that [illegible]n the engineering side of the industry ther[illegible] was a saving of £170,000 on fuel and £1,[illegible]0,000 on generation costs and £42[illegible]000 on distribution. This, however, was [illegible]ffset by an increase of £2,260,000 in adm[illegible]istration and general expenses. One item in which it appears that economy coul[illegible] have been exercised is that of publicity which increased from £269,000 in 194[illegible]49 to £490,000 in 1950–51 (82 per cent[illegible].

There are few Area Boards who can claim to have held their costs down in proportion to their increased sales or have reduced their costs by increased efficiency in administration.

The solution to some of the problems of the electricity supply industry lies in the restoration of engineer-managers in the Districts with authority and responsible directly to the Area Boards. The engineer-manager's efficiency should then be judged by the normal methods used throughout other industries.

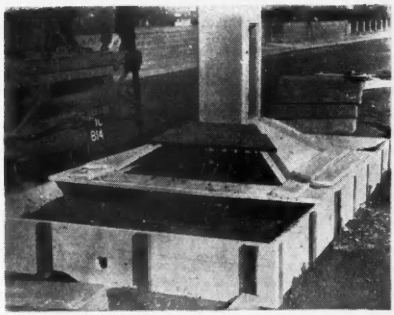
It remains to be seen whether the industry will carry through the necessary alterations or leave it to politicians to introduce them in further Acts of Parliament in years to come.

"FRUSTRATED."

Lighting Column Erection

Special Reinforcing at Dunblane

WHEN G.E.C. sodium lighting was being installed along a section of the A.9 road at Dunblane, Scotland, where it crosses the Allan Water, one of the columns had to be sited where the surface of the central grass reservation was only 12in above the decking of the bridge. To overcome the problem the Springbank Quarry Co., Ltd., manufacturers of the columns, arranged for one to be designed with special reinforcing. It had to be set in a concrete base measuring 12ft by 6ft by 2ft deep, and since the depth available was only 1ft the base had to project 1ft above the surface of the grass. On excavating the foundation, three G.P.O. ducts constructed of a pressed fibre material and an underground cable were revealed. After consultation with the G.P.O. it was decided to provide protection for the ducts consisting of a 12ft by 2ft mat of ⅝in and ½in dia. interlaced reinforcing rods. This was placed in position over the ducts and concrete poured in to a level of approximately 2in above the protective mat. The main reinforcing mat was then laid, the column with its complicated extended reinforcing set in position, and the base completed.



Base of column showing extended reinforcing

C.I.G.R.E. Programme

Tour of Swedish State Board's System

AFTER the close of the Conférence Internationale des Grand Réseaux Electriques, which extends from 28th May to 9th June, and the subsequent visits to the Blondel, Genissiat and Massif Central water power plants ending on 10th June, members will be afforded an opportunity of seeing 380 kV power transmission developments in Sweden.

A tour has been arranged by the Swedish State Power Board from 12th to 19th June to include the Harspranget 330 MW hydro-electric station, which is now going into service 30 miles north of the Arctic Circle; the 380kV transmission line to Hallsberg; the Midskog intermediate transforming station, 500 miles south of Harspranget, for interconnection with an existing 220 kV system and other hydro-electric stations; a 240 MW underground hydro-electric station under construction at Kilforsens; 220 kV 30 MVAr series capacitor at Alfta; Vasteras steam power station; and the A.S.E.A. works at Vasteras and Ludvika.

An addition to the list of papers by British authors to be presented in Paris, as given in the *Electrical Review* of 8th February, is one by Messrs. L. G. Gosland and I. S. Vosper which deals with a network analysis study of inherent restriking voltage transients on the British grid.

ELECTRICITY SUPPLY

Supply to Scottish Houses

Lake District Controversy

THE South West Scotland Electricity Board has approved a scheme, estimated to cost £42,000, for supplying electricity to over 900 houses which are being erected by Glasgow Corporation at Drumchapel. This is part of a larger scheme which provides for the construction of over 7,000 houses in that area during the next ten years. In the meantime the Board will erect two substations, one of which will be the main substation through which the whole of the Drumchapel scheme will be supplied.

Great Yarmouth Power Station

The consulting engineers to the Great Yarmouth Port and Haven Commissioners, having studied the proposals for the construction of the new power station at South Denes, have expressed the opinion that none of the works contemplated will have any detrimental effect on the harbour.

Taxation and Power Costs in Canada

The Quebec Power Company is planning new installations costing about $10 million during the next five years to provide the additional power required by new industries. Announcing this at the company's annual meeting, Mr. J. A. Fuller, president, added that, like other electric utilities, they had to face the problem of low charges and high taxes. Industries were attracted, among other things, by the very low cost of power—lower than was received by utilities in any other part of North America. At present, the company's average gross return per kWh sold was just 1·346 cents, less than in 1939, whereas the cost-of-living index had increased by 91 per cent.

Finding the money needed to extend the system in order to keep pace with the demand presented a problem. In 1951, the company's taxes and other payments to governments amounted to almost $1,000,000, or $1·67 per common share compared with $1·17 available to shareholders. The federal income tax was 44·5 per cent higher than in 1950, due in part to a higher taxable income but chiefly to the 31·5 per cent increase in the rate. Such taxation, Mr. Fuller said, imposed too much of a burden on an electric utility which, controlled by government regulation, could not increase its prices to compensate for increased costs without authority.

Seaside Illuminations

The Colwyn Bay Town Council has decided to extend the illuminations this season to include the Cayley Promenade and the Promenade from the Dingle to Old Colwyn at a cost of roughly £990.

Electricity and Planning

It was contended at a meeting of the Lakes Urban District Council at Ambleside that overemphasis on planning was mainly responsible for the long delay in providing electricity for the Langdale Valley. Councillor T. Atkinson said that Westmorland seemed to have a lot of people connected with planning who were holding up development. The Council passed a recommendation that the Lakeland Planning Board should permit the erection of overhead lines, suitably sited, to Langdale and Hartsop.

New offices of the East African Power and Lighting Co. in Nairobi, Kenya

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Associated Electrical Industries, Ltd., held its annual meeting on 1st April, Sir George Bailey (chairman) presiding. The chairman referred to the possibly onerous burden upon the company of the excess profits levy and went on to say that in the last twenty years £17 million had been devoted to increasing the size and number of their factories and the total floor area of offices, stores and factories now exceeded 285 acres. Referring to capital expenditure during 1951, Sir George said the Metropolitan-Vickers Co. had made a number of extensions to its Trafford Park factory, the most important being the increase in capacity of " D " aisle to deal with the growth of the demand for large electrical machines, particularly hydro-electric generators. In addition to extensions at Rugby, Willesden and Birmingham, the B.T.H. Co. had taken over factories at West Chirton, North Shields, Thorne, Yorks, and Stoke-on-Trent. At Harlow the Edison Swan Electric Co. had arranged to lease a new factory to be devoted entirely to the production of special tools and equipment for manufacturing valves and cathode ray tubes in factories at Brimsdown, Sunderland and Stansted.

Among notable orders received was one which Metropolitan-Vickers had secured for three hydrogen-cooled 100,000 kW 3,000 r.p.m. turbo-alternators for Castle Donnington which would operate at 1,500 lb per sq in pressure and a temperature of 1,050 deg F. They would be the first machines outside the United States of this size and speed to operate at this high steam pressure and temperature. Of the twenty B.E.A. power stations having the highest thermal efficiencies for 1950 the first six were stations equipped wholly or mainly with Metropolitan-Vickers generating plant. B.T.H. had received an order for a further two hydrogen cooled 60,000 kW 3,000 r.p.m. turbo-alternators for Meaford " B " power station, which also operated at 1,500 lb per sq in pressure and a temperature of 1,050 deg F, and they had received an order for a sixth 60,000 kW set for Staythorpe station. Both B.T.H. and Metropolitan-Vickers had received orders for transformers and circuit breakers for the first section of the e.h.v. 275 kV network which was being superimposed on the existing 132 kV grid. The B.T.H. circuit breakers would be of the oil-immersed type and the Metropolitan-Vickers breakers would be of airblast design. Metropolitan-Vickers had delivered to British Railways the first British built gas turbine locomotive and the B.T.H. had supplied a 1,200 h.p. gas turbine main propulsion unit for the Anglo-Saxon Co.'s tanker *Auris*, the first sea-going merchant vessel to include a gas turbine in her propelling machinery.

The group of companies continued to secure a large volume of orders for export, up to their maximum capacity. This year's order book showed a wide distribution of business throughout the world covering all the group's products. The chairman mentioned some of the notable export orders received.

The high reputation which the group had been able to maintain was largely influenced by their position in the vanguard of technical progress. They spent large sums on research and development work and had built up a vast fund of knowledge to augment the experience of their 61,000 employees. Since the institution of the apprenticeship schemes more than 18,000 young men had been trained, and twenty-eight of these were now directors of the various companies. To fulfil their heavy obligations still greater efforts were needed. With the value of orders in hand standing at the record figure of £135 million, he hoped that employees would realize that, given the raw materials, they need have no anxiety with regard to employment.

Dealing with the future outlook the chairman said that the total value of orders received in 1951 was 30 per cent higher than in 1950. Not only was more power required for increased mechanization in industry, but the public were also more and more regarding electrical appliances as essential in the home. That was evidenced by the fact that the Hotpoint group, in spite of the high rate of purchase tax on domestic appliances, had been able to maintain their sales, but to do this required considerable ingenuity in changing over to substitute materials. In the past the tendency had been for the consumption of electricity in this country to be doubled over 10/12 years, and available evidence tended to show that that rate of expansion would continue for some time to come. That meant that if the group was to maintain its premier position in the industry, it must continue to expand its manufacturing facilities. Much had been done in that connection from which they had not yet received full benefit.

Bruce Peebles & Co., Ltd.—Speaking at the annual meeting held on 28th March, Sir William Y. Darling, who presided, in referring to prospects said that the supply of materials was a difficult problem. The electrical

industry of this country was in a vulnerable position in so far as most of its vital raw materials had to be imported at prices not within our control. The company did not lack orders, and their order book for the larger units was heavily committed for a considerable period, but if there was no improvement in the present materials supply position, they might find themselves without the physical means to fulfil these orders expeditiously.

Clarke, Chapman & Co., Ltd., held their annual meeting on 28th March, Mr. J. B. Woodeson (chairman) presiding. In the course of his speech the chairman said that the electrical department had produced deck machinery for ore-carrying vessels with a.c. supply and they had now several orders for a.c. winches. They hoped to have tests and data completed before the end of the current year on a two-speed slip-ring motor-driven winch, and an a.c. variable speed commutator-driven winch. In the boiler department they had completed two 320,000 lb/hr boiler units for the Brunswick Wharf power station, Poplar, and the third and fourth boilers were now in an advanced state of erection. New contracts include two boilers for the B.E.A.'s Goldington station, Bedford, each having a capacity of 300,000 lb/hr, and four of 180,000 lb/hr for the Belfast electricity undertaking.

Ericsson Telephones, Ltd.—In the course of his speech at the annual meeting held on 31st March, Sir Harold A. Wernher (chairman) said that the telecommunications industry continued to make an important contribution to the country's export effort, and it was now around £20 million per annum. Their own overseas trade had been well maintained and represented a substantial part of their total sales. At home there was still a large unsatisfied demand for telephone service, and despite the fact that a quarter of a million new subscribers were added during the year, giving a total of about 5½ million telephones, there remained a waiting list of well over 500,000. As the Post Office exchange building programme had been curtailed by the Government there was little hope of the position improving. Regarding the current year, their order book was greater than at this time last year, but against this was a difficult raw material position.

British Insulated Callender's Cables, Ltd.—In our issue of 14th March we referred to the proposed issue of 3,109,614 new ordinary shares of £1 each at 22s per share to be offered in the proportion of one new share for each £3 of ordinary stock held. In a circular setting out the proposals, the directors state that the liquid resources of the company have been reduced by continued increases in labour and material costs and in particular by the levels of copper and lead prices. Part of the finance involved has been made available by profits retained in the business and part by short term loans and bank overdraft. The directors are now of opinion that part of this short term borrowing should be replaced by permanent capital. The net proceeds of the issue are estimated at £3,340,000.

A. Reyrolle & Co., Ltd., report a net profit for 1951 of £896,898, an increase of £121,403 as compared with 1950. The balance is struck after providing £1,175,000 for taxation. It is proposed to pay a final dividend of 6¼ per cent on the ordinary stock as increased by the share-for-share bonus last October. An interim dividend of 7½ per cent was paid on the old ordinary capital, so that the distribution for the year is equivalent to 20 per cent, less tax, on the old capital. For 1950 the distribution was 15 per cent.

The Telephone & General Trust, Ltd., reports a group profit for the year ended 31st December last, after meeting all charges, including £97,107 for taxation, of £148,806, as compared with £156,475 for the preceding year. The amount attributable to members of the holding company is £117,785 (against £123,400). It is proposed to pay a final ordinary dividend of 5 per cent on the ordinary stock, maintaining the distribution for the year at 8 per cent, and to pay an unchanged dividend of 8 per cent on the "A" ordinary stock. The balance carried forward is £100,345 (against £98,752 brought in).

The Metropolitan Electric Cable & Construction Co., Ltd., reports a net profit, after taxation, of £43,181, as compared with £23,933 for 1950. It is proposed to pay a final dividend of 15 per cent (against 5 per cent), making 25 per cent for the year (against 15 per cent).

Joseph Lucas (Industries), Ltd., has declared an interim dividend of 1⅝ per cent (unchanged).

Parmiter, Hope & Sugden, Ltd., have declared an interim dividend of 7½ per cent. This is at the same rate as for the previous year, but is paid on capital increased by a 40 per cent bonus. It does not imply any intentions as to the year's total.

New Companies

Malmesbury Electronics, Ltd.—Registered 25th March. Capital £3,000. Directors: H. L. Oura and Mrs. Winifred Oura. Regd. office: St. Michaels, Swindon Road, Malmesbury, Wilts.

Triggs & Widgery, Ltd.—Registered 25th March. Capital £3,000. Electrical engineers and contractors, etc. Directors: H. F. Widgery, E. H. Triggs and W. J. Triggs. Regd. office: Windle Works, Ringwood Road, Totton.

Totton Electrical Products, Ltd.—Registered 25th March. Capital £3,000.

Manufacturers of and dealers in electrical equipment, etc. Directors : E. H. Triggs and W. . Triggs. Regd. office : Windle Works, Ring ood Road, Totton.

Cr aton Electrical Co., Ltd.—Registered 25th March. Capital £200. To acquire the busi ss of Cranmer & Whitehead carried on by Arthur B. Cranmer and Leslie Waplington at 3 Barker Gate, Nottingham, and to carry on the business of electrical engineers and contractors, etc. Directors : A. B. Cranmer, L. Waplington and Gwendoline I. Armstrong.

D. G. Electrical Co., Ltd.—Registered 15th March. Capital £100. Manufacturers of and dealers in dynamos, motors, armatures, magnetos, batteries, etc. R. N. Emery signs as director. Regd. office : 317, High Holborn, W.C.1.

Guildford Batteries (1952), Ltd.—Registered 2nd February. Capital £8,000. Directors : A. C. D. Kingston, L. Jater, D. W. Hancock and E. Yearsley. Secretary : W. J. P. Gilmore. Regd. office : 6, Lea Pale Road, Guildford, Surrey.

Liquidation

C. Linnell & Sons, Ltd.—Winding up. Liquidator, Mr. P. J. Snow, 17, Albion Street, Hanley, Stoke-on-Trent.

Bankruptcies

S. F. Bent, residing at 16, Chatsworth Road, Droylsden, Lancs, electrician, formerly residing and carrying on business as "S. F. Bent & Sons," electrical contractors, at 362, Ashton New Road, Bradford, Manchester.—Order made 27th February suspending discharge for two weeks until 12th March.

C. F. Burns, carrying on business at High Street, Stalham, Norfolk, electrical and radio engineer.—First and final dividend of 1s 10½d in the £, payable at the Official Receiver's office, Castle Chambers, Opie Street, Norwich.

H. W. Daldry, lately carrying on business at 168, Bells Road, Gorleston-on-Sea, Suffolk, electrician.—First and final dividend of 1s 1½d in the £, payable at the Official Receiver's office, Castle Chambers, Opie Street, Norwich.

F. A. Walmsley, 48, Wyle Cop, Shrewsbury, Salop, electrical contractor.—Last day for receiving proofs for dividend 17th April. Trustee, Mr. F. C. Ormrod, 12, Lonsdale Street, Stoke-on-Trent, Official Receiver.

P. H. Leach, lately carrying on business at 4, Oxford Street, Guiseley, near Leeds, and at 5 and 8, Town Street, Yeadon, Yorks, radio and electrical engineer.—First and final dividend of 4.888d in the £, payable at the offices of Richards C. J. Russam & Co., Martin's Bank Chambers, 2a, Tyrrel Street, Bradford.

NEXT WEEK'S EVENTS

Wednesday, 16th April

LONDON.—London School of Hygiene and Tropical Medicine, 6.30 p.m. British Institution of Radio Engineers. "Current Radio Interference Problems," by E. M. Lee.

MANCHESTER.—Engineers' Club, Albert Square, 7.30 p.m. A.S.E.E. Manchester Branch. Lecturettes by members.

WEYMOUTH.—Technical College, 6.30 p.m. I.E.E. Southern Centre. "Computing Machines," by J. Bell.

Thursday, 17th April

CANTERBURY.—County Hotel, 8 p.m. A.S.E.E. Kent Branch. "Electrical precautions in Operating Theatres," by A. A. Mansell.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Utilization Section. "Equipment of Battery-Electric Vehicles," by W. D. Sheers, and "The Economic Basis of Battery-Electric Road-Vehicle Operation and Manufacture," by H. W. Heyman.

Connaught Rooms, W.C.2. Diesel Engine Users' Association. Annual Luncheon.

PLYMOUTH.—Grand Hotel, Plymouth, 3 p.m. I.E.E. South-Western Sub-Centre. "Modern Developments in Electric Welding," by Dr. H. G. Taylor.

STOKE-ON-TRENT.—Copeland Arms Hotel, 7.30 p.m. A.S.E.E. Crewe Branch. "Motor Fault Locating and Rewinds," by D. Bosworth.

Friday, 18th April

BIRMINGHAM.—Imperial Hotel, Temple Street, 6 p.m. I.E.S. Birmingham Centre. "Light from Space," by W. Wilson.

LONDON.—39, Victoria Street, S.W.1, 6.30 p.m. Junior Institution of Engineers. "Some Modern Submersible Pumping Applications," by W. L. Gardiner.

STOKE-ON-TRENT.—Electricity Showrooms, 7 p.m. I.E.E. North Staffordshire Sub-Centre. Annual general meeting. Discussion on "Should Measures to Limit Peak Demand at Particular Times be Introduced into Households by the Electricity Authority?"

BOOKS RECOMMENDED BY

ELECTRICAL REVIEW

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STOCKS and SHARES

THE harder tone which developed in Stock Exchange markets a week or so before the Easter holidays owed its inspiration to the more confident feeling that now prevails with regard to the stability and strength of sterling. This came about in its turn through the raising of Bank Rate, and the subsequent items of Government policy directed towards the same end of awakening a new spirit of hopefulness, after the dreary days of depression and uncertainty. The leading British Government stocks gave a notable display of firmness in which British Electricity and British Transport stocks participated. This movement had the effect of arousing fresh interest in the leading issues in the industrial market, with the result that prices showed substantial recoveries from the lowest levels to which they recently fell.

Tide of Recovery

Cable & Wireless ordinary, after being 103, rose to 110, and from previous lower levels, a general recovery made Tube Investments, 5 $\frac{5}{16}$, Telegraph Construction, 34s 6d, British Aluminium (helped by the dividend increase), 39s, Associated Electrical, 68s 6d, and Lucas, 32s. Enfield Cables, 26s, International Combustion, 21s 6d, E.M.I., 16s, and Ericssons, 36s 6d, are examples of many others in which recovery followed upon a period of heaviness and neglect. Money has started to come once more into the Stock Exchange and were it not for the excess profits levy the prospects for further improvement might be cautiously described as promising.

Views on E.P.L.

If this year's profits of Associated Electrical Industries are the same as those of 1951, the new excess profits levy will probably add about £350,000 to the company's tax burden. The latter was already as high, in 1951, as £5·4 million (which compares, incidentally, with the net total of £673,000 distributed in dividend to ordinary stockholders). Giving this information at the annual meeting, Sir George Bailey hoped that during the passage of the Finance Bill the Chancellor would be able to avoid sacrificing industrial efficiency on the altar of taxation. Having regard to the conservative character of the present dividend rate, hopes are expressed that the E.P.L. is not in itself likely to upset the expectation of its maintenance.

At the Hoover meeting, the chairman said that last year's taxation left the company with £1·2 million out of a total profit of £3 million. Given the same profits this year, E.P.L. would apparently bring the surplus down to a million. This is a company which has raised its earnings from overseas business to £1·7 million, compared with a total export turnover of £105,000 before the war. Sir Charles Colston dwelt particularly on the discouraging effect of the levy on businesses which are showing only now the results of heavy and expensive spadework during the E.P.L. " standard " years of 1947–9.

Reyrolle Dividends

Reyrolle's final dividend of 6¼ per cent on ordinary capital double that of a year ago has been well received in the market as satisfactory in itself and also in its implications for the future annual rate of payments. This last factor is not altogether clear, because of the 100 per cent share bonus which intervened between the interim and final payments for 1951. On half the present capital the company paid 15 per cent for the whole of 1950 and a subsequent interim of 7½ per cent. On the basis of the present capital, the total distribution for 1951 has consequently been raised from the equivalent of 7½ to 10 per cent. From the 6¼ per cent final, however, market opinion thinks it a reasonably safe assumption to take the probable annual rate as double that figure. The £1 shares hardened to 41s 6d on the announcement, and would, on those terms, give 6 per cent on an investment.

B.I.C.C. New Shares

There was a ready demand, in early dealings, for the new £1 ordinary shares offered at 72s to existing stockholders in British Insulated Callender's Cables. Good buying countered the usual selling of " rights," with the result that an opening premium of 2s 6d soon improved to about 4s. Interest in the issue was encouraged by the analogy of the earlier issue of G.E.C. ordinary shares: these were issued at 72s 6d, and rose steadily after the calls were paid and the final date for renunciations approached. Stockholders exercising their rights to the B.I.C.C. shares are acquiring them on a prospective yield basis of over 6¾ per cent, assuming a repetition of the dividend at 7½ per cent; they will not, however, be entitled to the final for 1951, due to be declared this month. Having regard to the premium, they should note the invitation to apply for " excess " shares not subscribed for by way of rights.

The first call of 10s on the new shares fell due for payment on the 10th of this month and the second of 12s has to be met by 23rd May, which also is the last date for renunciations. Until then, shares will be transferable free of the 2 per cent stamp duty to new buyers. Bought at a premium of 4s on the issue price of 22s, the shares give an indicated return of £5 15s 6d per cent on the money, a rate which would be difficult to improve upon, by present standards, from other front-rank industrials.

Engineering in Europe

Survey of Current Literature

ALTHOUGH the oxidation tendency and rate of an oil are not the only characteristics that matter from the viewpoint of its use for electrical purposes, they are certainly among the most important factors. This fact explains the surprisingly large number of different methods of testing these properties that are used. Most of them are multiple tests and are combinations of chemical (analytical) and physical (optical and electrical) measurements. The particular physical characteristics measured are specific spreading value, oil colour and dielectric losses, and the chemical test is a qualitative determination of the oxygen absorbed.

The author describes a recording apparatus for carrying out continuous oxygen-absorption tests, recorded in an ingenious way by a photo-cell arrangement in whose optical field a drop of liquid silicone indicates the volume expansion of the oil after oxygen absorption. The instrument is highly sensitive, as is proved by the results of tests on three oxidation-resistant oils. Further interesting features of the article are absorption and ultra-violet spectra of oxidized oils (dissolved in hexane) taken with a Beckman spectrometer which enables oxidation stability to be determined.—" Oxidation of Mineral Oils," N. E. M. Hagethorn, *Electrotechniek*, Vol. 29, No. 25, pp. 471–475, 6th December, 1951, in Dutch.

Transformer Testing

This very comprehensive survey includes descriptions of all kinds of possible and usual transformer tests at the makers' works during and after production, acceptance and routine tests at the place of use, fault-finding, after-repair and design-stage tests of new transformers for improving their safety of operation and insulation. The works tests include determination of winding resistance, verification of transformation ratio and connection of windings, determination of no-load losses and magnetizing current, s.c. losses and s.c. voltage corresponding to full rated voltage; voltage tests using a separate source, induced voltage and, possibly, with surge voltages; tests of the dielectric properties of the oil and checking of auxiliaries and equipment of the transformer. For prototypes, heat runs on actual or simulated loads and, if conditions permit, tests of the mechanical strength to withstand short-circuit stresses are usual.

The second part of the paper is more particularly devoted to impulse testing, explaining the principle with reference to equivalent diagrams of the windings and the test circuits used. A diagram representing the main types of voltage distribution set up under single-, two- and three-phase surges is also shown, in addition to numerous oscillograms of shock waves and their effects on transformer windings. Although the discussion is necessarily brief, it is very clear and informative.—" Testing of Power Transformers," J. Hassdenteufel, *Elektrotechnicky Obzor*, Vol. 40, No. 5–6, pp. 104–113; No. 11–14, pp. 237–242, 1951; in Czech.

Line Tower Potential

At high transmission voltages no other neutral earthing method than direct earthing is possible, which means that every earth fault becomes a short-circuit to earth and involves danger to the personnel of power stations and substations and, to a certain extent, also to passers-by in the neighbourhood of transmission towers and masts. It is true that modern relay protection is capable of clearing faults within fractions of a second, but it cannot reduce the magnitude of the short-circuit currents to earth. Furthermore, the areas affected (those becoming dangerous to life during an earth-fault) are only of the order of 100 metres square and, as most masts of overhead lines are in fields and woods, the

Readers who require accurate full translations of any of the articles abstracted in this section can be put into touch with the translators who will supply them at current rates.—Editors, *Electrical Review*.

probability of accidents is small. However, those near crossings of lines over roads, or inside built-up areas, have to be rendered harmless by earthing rings which reduce the potential differences and step voltages to permissible values.

The potential distribution set up on the ground by such a ring can be calculated rigorously, but the solution obtained involves elliptic integrals which are not only awkward to handle, but complete tables of which are rarely, if at all, available. In most cases in which elliptic integrals represent the rigorous solution, convenient approximations can be found without undue loss of accuracy. It is shown in this article that a summation method based on a division of the ring into 36 elements yields such an approximation sufficiently accurate for the purpose in mind. This method, first shown in its application to a single earthing ring, is then extended to a system with several concentric rings, which is the required form of earthing for actual potential control around a line mast or tower. It is shown that four concentric rings around a tower will render a fault voltage of 3,100 V of the tower harmless to passers-by.—" The Potential Control of Overhead Line Towers," W. Koch, *Elektrotechnische Zeitschrift*, Vol. 72, No. 22, pp. 651–655, 15th November, 1951, in German.

Low-voltage Fuses

The NH-fuses, on which considerable development work has been done in recent years, satisfy all the conditions regarding selectivity and response time imposed by their use in interconnected l.v. systems, as well as those regarding the safety of the operators. As they are of the cartridge type, their arc-quenching and selective-response characteristics are superior to those of open fuse-links. Nevertheless there are certain shortcomings, which fall roughly into the following groups: (1) excessive temperature rises in the fuse contacts and fittings; (2) blowing of fuses below the limiting value; (3) non-selective blowing at overloads and short-circuits; and (4) blowing at s.c. currents below the fuse rating. These undesirable phenomena can be traced back to bad heat-exchange characteristics and to ageing of the fuses, the latter accelerated by frequent overloads.

Comprehensive tests for current-carrying capacity, temperature rises, voltage drops across fuse-links and contacts separately, etc., led to the introduction two years ago of a new type of " cold " fuse cartridges (the last step in the long series of successive improvements). These show a decisive reduction of temperature rises, voltage drops, heat losses and remarkable freedom from signs of deterioration through ageing under overloads. However, it must be stressed that complete safety can be obtained, or maintained, only if the same attention is given to the maintenance, servicing and, if required, replacement of fuse contacts and bases as to the fuse-links themselves. — " Operational Experience and Tests on Low-Voltage High-Duty Fuses under Temporary Overloads," H. Feindt, *E.T.Z.*, Vol. 73, No. 1, pp. 10–14, 1st January, 1952, in German.

Resistivity of Floors

These measurements formed part of comprehensive investigations made by G. Bodier (same issue *ibid.*, pp. 683–710) and were meant to detect the specific shock risks in and around workshops. The measurements covered apparent resistivities of various types of ground on a workshop site, contact resistances and body resistances (between hands and feet) on contact with machine tools of a maintenance workshop with a concrete floor. The potential distribution around the machines was mapped out and the actual danger spots were determined. Corresponding measurements were made after interconnecting all the machines and other heavy metal masses in the workshop (e.g., a heavy filing vice). Inside the workshop danger spots were found in the neighbourhood of a grinding wheel where the floor (otherwise dry concrete) was always slightly moist and also near a metal column supporting the roof. Similar measurements were also made in a weaving shop, where the greatest danger was found to exist between two neighbouring looms. Interconnection of the machines in the workshop (of the looms in the second case) reduced the dangers by 20–30 per cent.—" Measurements in Workshops of the Apparent Resistivity of the Floors and the Dangers of Making Metal Masses Accidentally Live: Effect of Equipotential Connections between Masses." H. Bastard, *Bulletin* Soc. Française des Electriciens, Vol. 1, 7th Series, No. 11, pp. 711–716, November, 1951, in French.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 21st May from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1946

44[illegible]. Marconi's Wireless Telegraph Co., Ltd.—Cold cathode gaseous electron-discharge tubes. 13th February, 1946. (672231.)

31[illegible]2. Philips Lamps, Ltd.—Systems for amplifying, generating or otherwise operating upon oscillations of very high frequency and electron-discharge tubes for use therein. 22nd October, 1946. Cognate application 31373, 3rd September, 1946. (672639.)

1947

34[illegible]6. Cleveland, F. J. (Bendix Aviation Corporation).—Voltage and frequency regulating system for a motor-alternator. 24th December, 1947. (672233.)

1948

9125. Missenard, F. A.—Heating room spaces by means of elevated heating elements. 31st March, 1948. (672613.)

9312. Brush Development Co.—Manufacture of magnetic recording media. 2nd April, 1948. (672644.)

15810. Radio Corporation of America.—High-frequency electron-discharge device and circuit. 11th June, 1948. (672646.)

19535. British Thomson-Houston Co., Ltd.—Liquid halogenated polymerization products. 21st July, 1948. (672617.)

19760. British Thomson-Houston Co., Ltd.—Circuit arrangements for electric discharge lamps. 23rd July, 1948. (672234.)

21568. Mullard Radio Valve Co., Ltd., and Jones, E.—Television receivers. 16th August, 1948. (672648.)

22282. Sonotone Corporation.—Electro-mechanical transducers. 24th August, 1948. (672236.)

30546. Metropolitan-Vickers Electrical Co., Ltd., and Neville, S.—Alternating current dynamo-electric machines. 20th December, 1949. (672652.)

1949

875. Shardlow Electric Wires, Ltd., and Moulton, E. W.—Electrical connector. 13th February, 1950. (672239.)

1093. Vickers-Armstrongs, Ltd., and Nash, A. R. B.—Remote control servo motor. 11th January, 1950. (672240.)

7866. Lucas, S. H.—Means of producing ion or electron streams of great intensity. 22nd March, 1950. (672245.)

7939. Scophony-Baird, Ltd., and Anderson, E. G. O.—Television receivers. 23rd March, 1950. (672247.)

8105. F. & F. Electrical Fittings, Ltd., and Burke, M.—Pressure cookers. 28th March, 1950. Cognate application 20707, 9th August, 1949. (672248.)

11340. Zenith Radio Corporation.—Television transmitters. 28th April, 1949. (672250.)

11651. Philips Electrical, Ltd.—Method of and circuit for producing a voltage of substantially triangular or trapezoidal waveform. 2nd May, 1949. (672251.)

14865. Ward, Blenkinsop & Co., Ltd., Hopf, P. P., and Lishmund, R. E. J.—Production of conducting layers upon electrical resistors. 31st May, 1950. (672255.)

15415. Communications Patents, Ltd.—Electronic valve amplifiers. 8th June, 1950. (672256.)

15571. Zimmerman, E.—Method and apparatus for fusing dielectric material in a partial vacuum by high frequency electric fields. 22nd June, 1949. (672258.)

16867. Ward, Blenkinsop & Co., Ltd., Hopf, P. P., and Lishmund, R. E. J.—Production of conducting layers upon electrical insulating materials. 20th June, 1950. (672260.)

18978. Philips Electrical, Ltd.—Manufacture of electron-discharge tubes. 19th July, 1949. (672266.)

20788. Measurement, Ltd., and Hewlett, S. J.—Telemetering apparatus. 3rd August, 1950. (672268.)

21475. Raffinerie Tirlemontoise Soc. Anon.—Electrolysis apparatus. 18th August, 1949. (672270.)

22399. British Insulated Callender's Cables, Ltd., and Grieve, G. T. W.—Manufacture of metal tubes and cable sheaths. 29th August, 1950. (672272.)

26405. Sodeco Soc. des Compteurs de Gene.—Drum counter for apparatus indicating telephone charges. 11th October, 1949. (672288.)

27427. Compagnie Générale de Télégraphie sans Fil.—Ultra-short-wave oscillators. 25th October, 1949. (672292.)

29681. Compagnie des Freins et Signaux Westinghouse.—Wide-band wavemeter. 21st November, 1949. (672299.)

30319. British Insulated Callender's Cables, Ltd.—Manufacture of electric capacitors. 24th November, 1950. Divided out of 672330. (672301.)

31911. Davidson, A. D., and Scammell, E. W.—Heating elements for electrically heated appliances. 12th December, 1950. (672305.)

32218. British Thomson-Houston Co., Ltd.—Refrigerating systems. 15th December, 1949. (672308.)

32421. Parsons, Ltd., C. H., and Handley, G. B.—Electric tumbler switches. 15th December, 1950. (672309.)

33013. Akt.-Ges. Brown, Boveri & Cie.—Arrangement for controlling electric circuit breaker group having two or more poles. 23rd December, 1949. (672312.)

1950

241. Graham-Farish, Ltd.—Fractional h.p. electric motors. 22nd March, 1950. (672316.)

744. British Tabulating Machine Co., Ltd.—Electronic counters. 11th January, 1950. (672321.)

1475. British Thomson-Houston Co., Ltd.—Air cleaning apparatus. 19th January, 1950. (672328.)

1700. Technicolor Motion Picture Corporation.—Controlling mechanisms responsive to records having columns of signals. 23rd January, 1950. (672431.)

1961. Western Electric Co., Inc.—Negative feedback amplifiers. 25th January, 1950. (672332.)

2220. Lincoln Electric Co.—Flux for use in arc welding. 27th January, 1950. (672333.)

2401. British Insulated Callender's Cables, Ltd.—Manufacture of electric capacitors. 24th November, 1950. (672330.)

2590. Gravener Manufacturing Co., Ltd., Wilkinson Sword Co., Ltd., Mathisen, A., Hall, H. W., and Strain, R. N. C.—Temperature change responsive devices for use in power plant units and for other purposes. 3rd April, 1950. (672343.)

3192. Oldham & Son, Ltd., and Martin, J. R.—Liquid level indicators, more particularly for electrical storage cells or batteries. 7th February, 1951. (672539.)

3284. British Insulated Callender's Cables, Ltd.—Electric cables suitable for use for currents at high-frequencies. 7th February, 1951. Cognate application 6894, 20th March, 1950. (672541.)

3287. Metropolitan-Vickers Electrical Co., Ltd.—Railway vehicles. 1st January, 1951. (672542.)

3301. General Electric Co., Ltd., and Kyte, D. J.—Crystal contact devices. 29th January, 1951. (672543.)

3683. Electric & Musical Industries, Ltd.—Electric irons. 14th February, 1951. (672549.)

1171. Fairweather, H. G. C. (Svenska Turbinfabriks Aktiebolaget Ljungström).—Steam pipes of turbines. 21st February, 1950. (672368.)

4844. Marconi's Wireless Telegraph Co., Ltd.—Thermionic valve circuit arrangements. 18th October, 1950. (672373.)

4981. British Thomson-Houston Co., Ltd.—Refrigerating apparatus. 27th February, 1950. (672375.)

4982. British Thomson-Houston Co., Ltd.—Hall effect frequency meters. 27th February, 1950. (672376.)

5013. Compagnie Générale de Geophysique.—Electromagnetic vibratory interrupters. 27th February, 1950. (672377.)

5160. Aston Electrical Products, Pty., Ltd.—Multiple sequence electric control means for use with resistance welders, electrical circuits and process control apparatus. 1st March, 1950. (672381.)

5197. British Thomson-Houston Co., Ltd.—Photo flash lamps. 1st March, 1950. (672382.)

5750. Electrical Apparatus Co., Ltd., and Barbour, R. H.—Electromagnetically trippable relays. 29th November, 1950. (672384.)

5823. Cole, Ltd., E. K., and Jackson, W. J. C.—Electric panel heaters. 31st July, 1950. (672385.)

6069. Igranic Electric Co., Ltd.—Rotary electric switches. 10th March, 1950. (672388.)

6607. Plessey Co., Ltd.—Electromagnetic vibratory interrupters. 16th March, 1950. (672391.)

6622. British Thomson-Houston Co., Ltd., and Blood, W. R.—Thermal responsive glow discharge switches. 27th February, 1951. (672560.)

6769. Associated Electrical Industries, Ltd.—Device for facilitating the drawing of the normal at a point on a plane curve. 4th January, 1951. (672563.)

9836. Pirelli-General Cable Works, Ltd., and Arman, A. N.—Electric cables. 16th February, 1951. (672567.)

10494. Philips Electrical Industries, Ltd.—Electric circuits. 28th April, 1950. (672434.)

11022. Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—Television pick-up tubes. 4th May, 1950. (672438.)

12941. Metallges Akt.-Ges.—Electro filters. 23rd May, 1950. (672458.)

13071. Siemens Schuckertwerke Akt.-Ges.—Stage electric lighting circuits and the like. 24th May, 1950. (672640.)

13207. Marconi's Wireless Telegraph Co., Ltd.—Radar systems. 15th February, 1951. (672571.)

13809. General Motors Corporation.—Electro-motive traction system. 2nd June, 1950. (672466.)

13849. British Thomson-Houston Co., Ltd.—Sound reproducing devices. 2nd June, 1950. (672467.)

14618. Smitsvonk N. V.—Low-voltage surface-discharge sparking plugs for internal-combustion engines. 12th June, 1950. (672472.)

15361. Thorens Soc. Anon., H.—Device for adjusting the frequency of oscillatory electric circuits. 20th June, 1950. (672483.)

15712. Willard Storage Battery Co.—Electric storage batteries. 23rd June, 1950. (672488.)

15728. Allis-Chalmers Manufacturing Co.—Totally enclosed dynamo-electric machines. 28th June, 1950. (672489.)

15797. Siemens & Halske Akt.-Ges.—Telephone instrument having a dialling switch. 23rd June, 1950. (672490.)

15915. Bendix Aviation Corporation.—Magneto generators. 26th June, 1950. (672491.)

16017. Western Electric Co., Inc.—Blanking circuits for cathode-ray tubes particularly television receiver tubes. 27th June, 1950. (672493.)

16069. Sylvania Electric Products, Inc.—Apparatus for inverting tubular lamp bulbs in sealing machines. 27th June, 1950. (672494.)

17839. Huwyler, A.—Automatic speed control systems for alternating-current motors. 17th July, 1950. (672507.)

17946. British Thomson-Houston Co., Ltd.—Frequency response systems. 18th July, 1950. (672509.)

18666. Philips Electrical Industries, Ltd.—Manufacture of wire-shaped component members provided with one or more strips of tape material. 26th July, 1950. (672514.)

18681. British Thomson-Houston Co., Ltd.—Electric valve converting systems. 26th July, 1950. (672515.)

19246. Metropolitan-Vickers Electrical Co., Ltd.—Precision electric resistor devices. 1st August, 1950. (672519.)

19494. Compagnie pour la Fabrications des Compteurs et Matériel d'Usines à Gaz.—Television pick-up tubes or the like. 4th August, 1950. (672521.)

20335. British Thomson-Houston Co., Ltd.—Transmission belts. 16th August, 1950. (672531.)

20427. Standard Telephones & Cables, Ltd.—Magnetic tape storage containers. 17th August, 1950. (672576.)

22061. Naamlooze Vennootschap Philips' Gloeilamfabrieken.—Variable capacitors. 7th September, 1950. (672592.)

22288. Delbord, G. L.—Colour television transmitting systems. 11th September, 1950. (672585.)

22428. British Thomson-Houston Co., Ltd.—Coil tinning devices. 12th September, 1950. (672586.)

22433. Hills, W. D.—Electrical heating devices. 12th September, 1950. (672587.)

25195. Preh, A., and Preh, W. (trading as Preh Elektrofeinmechanische Werke).—Device for tracing short circuits in electrical apparatus. 16th October, 1950. (672604.)

25522. Land-und Seekabelwerke Akt.-Ges.—Flexible electrical multi-core heavy current cable. 19th October, 1950. (672608.)

25757. Philips Electrical Industries, Ltd.—Cathodes for use in electron discharge tubes. 23rd October, 1950. (672610.)

28988. Boyd, W., Kelk, G. F., and Clarke, J. E.—Electrically heated blade. 27th November, 1950. (672658.)

29080. Philips Electrical Industries, Ltd.—Cathode-ray tubes. 28th November, 1950. (672622.)

29215. Philips Electrical Industries, Ltd.—Cathode-ray tube deflection systems. 29th November, 1950. (672624.)

29248. British Thomson-Houston Co., Ltd.—Hall effect synchroscopes. 29th November, 1950. (672625.)

29583. British Kaumagraph Transfers, Ltd.—Electric irons. 4th December, 1950. (672628.)

30143. Potier, G. X. N.—Method of transmission by means of electrical impulses subjected to two simultaneous modulations. 8th December, 1950. (672629.)

30603. Metropolitan-Vickers Electrical Co., Ltd., and Neville, S. Alternating current dynamo-electric machines. 20th December, 1949. Divided out of 672653. (672637.)

30647. Western Electric Co., Inc.—Barrier grid signal storage tubes. 15th December, 1950. (672656.)

30994. Allmanna Svenska Elektriska Aktiebolaget.—Rotor windings for electric commutating machines. 20th December, 1850. (672631.)

1951

5623. Westinghouse Electric International Co.—Magnetic core structures. 8th March, 1951. (672430.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 19th April:—

VITROMIC. No. 704,406. Class 9. Electric instruments and apparatus and parts thereof, all included in Class 9.—A. L. G. Cianchi, 13, Abel Close, Adeyfield, Hemel Hempstead, Bucks.

GRAFARC. No. B694,772. Class 11. Electric arc lamps.—Strong Electric Corporation, Toledo, Ohio, U.S.A. Address for service, c/o Lloyd Wise, Bouly & Haig, 10, New Court, Lincoln's Inn, London, W.C.2.

STRONGHOLD BRAND (design). No. B691,621. Class 17. Electrical insulating tapes.—Garford-Lilley Industries, Ltd., trading also as City Textile Co., Harvey Road, Derby.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—MELBOURNE.—16th April. State Electricity Commission of Victoria. Supply of a two million volt impulse generator and associated equipment. (C.R.E. 11893/52. Ten/3776.)*

Gateshead.—7th May. Corporation. Electrical installation in proposed offices for the Borough Treasurer's Department. (See this issue.)

Greece.—ATHENS.—12th May. Ministry of Communications. Telecommunications Reconstruction Procurement Committee. Supply of junction telephone cable and switching equipment. (C.R.E. 11274/52. Ten/3782.)*

New Zealand.—WELLINGTON.—23rd April. Post and Telegraph Department. Supply of 1,000 capacitors. (C.R.E. 11934/52. Ten/3779.)*

15th July. State Hydro-Electric Department. Supply of 6,500 suspension and strain insulator assemblies for Roxburgh—Dunedin 110 kV line. (C.R.E. 11538/52. Ten/3783.)* Supply of 3,100 suspension and strain insulator assemblies for Roxburgh—Dunedin 220 kV line. (C.R.E 1539/52. Ten/3784.)* Supply of 690 suspension and strain insulator assemblies for Islington—Addington 66 kV line. (C.R.E. 11540/52. Ten/3793.)* Supply of 880 suspension and strain insulator assemblies for Stratford—New Plymouth 110 kV line. (C.R.E. 11325/52. Ten/3785.)*

Portuguese East Africa. — LOURENÇO MARQUES.—29th April. Ports, Railways and Transport Department. Supply of various electrical equipment. (C.R.E. 10937/52. Ten/3789.)*

Southern Rhodesia. — SALISBURY.—S. Rhodesian Government. Supply of 4,047 6 V and 12 V storage batteries for use in motor vehicles and equipment. (C.R.E. 11804/52. Ten/3791.)*

ORDERS PLACED

Chester.—Educational Committee. Recommended. Stage lighting at Overleigh School (£460).—Merseyside & North Wales Electricity Board.

Hendon. — Highways Committee. Recommended. Improved lighting of North Circular Road (Hendon Way to Edgware Road): Concrete lighting columns (£1,120).—Concrete Utilities, Ltd. Electrical equipment (£1,155).—Revo Electric Co., Ltd.

Newcastle-on-Tyne.—Education Committee. Installation of electrical services at the new workshops for the Rutherford College of Technology (£6,950).—Robson & Coleman, Ltd.

Southgate.—Highways Committee. Recommended. Supply and erection of concrete columns and the installation of lanterns and control gear for improvement of main road lighting (£5,507).—Concrete Utilities, Ltd. Lanterns and control gear (£2,547).—Revo Electric Co., Ltd.

Southport.—Corporation. Supply of 1,225 yards of armoured cable, required for the Pier illuminations (£949).—Johnson & Phillips, Ltd.

Tynemouth. — Town Council. Electrically driven pumping machinery for the second stage of the Wansbeck pumping station scheme (£10,285).—Sulzer Brothers.

Wakefield. — Welfare Services Committee. Electrical installation and fittings at Kettlethorpe Hall (£662).—H. Smith (Wakefield).

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alnwick.—Additional school accommodation (£14,000); county architect, County Hall, Newcastle.

Amble.—Houses (52), Links estate; A. W. Charity, U.D.C. surveyor.

Audenshaw.—Houses: Ford Bank Estates, Ltd., 25, Cross Street, Manchester (28); W. Hughes, Audenshaw (10); and S. Kelly & Bros., Ltd., Ashton (20).

Birmingham.—Civic restaurant, High Street, Deritend; Parsons & Morrin, Ltd., 133, Belgrave Road, Birmingham.

Blackpool.—Houses (67), Branstree Road, Mereside estate; borough engineer.

Blyth.—Houses (94), in 14 parishes, for R.D.C.; surveyor, Council Offices, Rendham Road, Saxmundham, Suffolk.

Bolton.—Houses (42), Johnson Fold No. 2 estate; F. Pardon, Ltd., Bolton.

Boston.—Houses and flats (100), Frieston Road; borough architect, Town Hall, Boston.

Brandon (Co. Durham).—Pithead baths at Pit House Colliery; Gradon & Son, builders, North Road, Durham.

Brighton.—Development and extensions at Patcham pumping station (£146,000); borough engineer.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

Bury.—Further 136 houses at Topping Fold estate; borough engineer.

Caernarvonshire.—Grammar school, Brynrefail, and primary school, Vaynol; county architect.

Carnforth.—Houses (50), Kellet Road estate; Middleton & Jones, architects to U.D.C., 1 Queen Street, Lancaster.

Cheadle.—Ambulance and fire stations, for Staffs C.C.; A. C. H. Stillman, county architect, Martin Street, Stafford.

Coventry.—Stage 2 of Caludon Castle Secondary School; Thos. Bates & Son, Ltd., 52, Warwick Street.

Crawley.—Four factories on industrial site for Development Corporation; chief engineer, Broadfield, Crawley, Sussex.

Dalton-in-Furness.—Houses (50), Greystone and Auty Cross estates; A. Taylor, surveyor, Town Hall.

Dearne.—Houses (70), Whin Wood site; W. H. Adams, surveyor to U.D.C., Council Offices, Bolton-on-Dearne.

Droylesden.—Flats (50), Moorside Street, for U.D.C.; F. Bradley, architect, 4, Wood Street, Bolton.

Durham.—Medical centres at pits at Washington, Usworth, Fishburn, Langley Park, Brancepeth and Watergate; N.C.B. Architects' Department, Ashfield Towers, Gosforth, Newcastle-on-Tyne.

Health centre at Peterlee (£32,000); county architect, Court Lane, Durham.

Fleetwood.—Houses (70), West View estate; borough surveyor.

Flockton.—Pithead baths, Lepton Edge Colliery; National Coal Board, North Eastern Division, 27, Cavendish Road, Leeds.

Folkestone.—Houses (120), Creteway Down; borough surveyor, West Terrace.

Gaywood (King's Lynn).—Mixed school; W. O. Bell, chief education officer, Stracey Road, Norwich.

Glenrothes.—Houses (93), Auchmuchty; architect to Development Corporation.

Hebburn.—Houses (36), Harleyburn Avenue; H. E. Pitt, Ltd., Leopold Street, Hillfield, Sunderland.

Hemingford.—Houses (10) for St. Ives (Hunts) R.D.C.; C. Duller, Hemmingford Grey, Hunts.

Hyde.—Houses (200), Cheetham Fold estate; borough surveyor.

Works extensions; Imperial Chemical Industries, Ltd., Leathercloth Division, Newton Road.

Ipswich.—Junior school, Chantry estate; Johns & Slater, architects, 32, Foundation Street.

Houses (62), Chantry estate; borough engineer.

Kettering.—Fire brigade headquarters at the Headlands; county architect, Guildhall Road, Northampton.

Litherland.—Flats (96) at Linacre Road; Quiggin & Gee, architects, 11, Old Hall Street, Liverpool.

Liverpool.—Two blocks of flats at Aigburth for West Lancs T. and A. F. Association; J. B. Johnson, Ltd., 18, Crown Street.

London.—Building for N.F.U. central headquarters, 25-31, Knightsbridge; Ward & Partners, architects, Lowndes Street, S.W.1.

CAMDEN TOWN.—Flats (115), for St. Pancras B.C.; Norman & Dawbarn, architects, 5, Gower Street, W.C.1.

HANWELL.—Ambulance station, Boston Road; Middlesex C.C., County Hall, Westminster, S.W.1.

LEWISHAM.—Dwellings (125), Lawn Terrace; borough architect.

SOUTHWARK.—Offices and warehouse, Bankside and Emerson Street, for Beck & Pollitzer, Ltd., transport contractors, etc.; J. R. Hill, architect, 15, Queen Square, E.C.4.

Lyme Regis.—Extensions to Hospital; architect to South Western Regional Hospital Board, "Roxburgh," Clifton Down, Bristol, 8.

Newcastle-under-Lyme.—Houses for B.C.: Baddeley Bros. (22) and J. E. Robinson, Newcastle (11).

North Riding.—Conversion of buildings at Topcliffe Aerodrome into school for the C.C.; county architect, County Hall, Northallerton.

Norwich.—Dwellings (172), North Park Avenue site; city architect, City Hall.

Peterborough.—Trades school for training craftsmen; Baker Perkins, Ltd., engineers, Westwood Works.

Richmond (Yorks).—Houses (14) at Catterick for the R.D.C.; N. Dent, architect, Finkle Street Chambers, Richmond.

Scunthorpe.—Flats (60), Lincoln Gardens estate; borough architect, Town Hall.

Sheffield.—Factory at Solly Street for E. S. Shillito, Ltd.; Tom Holmes & Son, Ltd., Bradway, Sheffield.

Shotley Bridge.—Triple operating theatre at Shotley Bridge for Newcastle Hospital Board, "Dunira," Osborne Road, Newcastle-on-Tyne; chief architect.

Smallburgh.—Houses (52), in eight parishes; clerk to R.D.C., Council Chambers, Stalham, Norwich.

South Shields.—First stage of new technical college for E.C. (£193,000); Henderson Brothers, contractors, Smith Street, Tyne Dock, South Shields.

Substation and ancillary buildings for proposed new iron ore quay at Tyne Dock for Tyne Improvement Commission; Couves & Partners, architects, Carliol House, Newcastle-on-Tyne.

Sunderland.—Oil storage depot at Hendon Docks (£50,000); Vacuum Oil Co., Ltd., Oxford Street, London, W.1.

Tipton.—Factory for the Idoson Motor Cylinder Co., Ltd.; R. M. Douglas, Ltd., George Road, Erdington, Birmingham.

Tredegar.—Infants' school, Sirhowy; C. L. Jones, architect, Queen's Hill, Newport, Mon.

Waltham Cross.—Junior and infants' school, Park Lane; Hening & Chitty, architects, 20, Gower Street, W.C.1.

Warwick.—Thoracic surgery unit at King Edward VII Sanatorium; Birmingham Regional Hospital Board, 10, Augustus Road, Edgbaston, Birmingham.